Fishery Data Series No. 03-11

Escapements of Chinook Salmon in Southeast Alaska and Transboundary Rivers in 2001

by

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June 2003

Alaska Department of Fish and Game Division of Sport Fish

Symbols and Abbreviations

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
metric ton	mt
milliliter	ml
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
ounce	oz
pound	lb
quart	qt
yard	yd
Spell out acre and ton.	

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
hour (spell out for 24-hour clock)	h
minute	min
second	s
Spell out year, month, and week.	

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.
All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.
and	&
at	@
Compass directions:	
east	E
north	N
south	S
west	W
Copyright	©
Corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
et alii (and other people)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.,
id est (that is)	i.e.,
latitude or longitude	lat. or long.
monetary symbols (U.S.)	\$, ¢
months (tables and figures): first three letters	Jan,...,Dec
number (before a number)	# (e.g., #10)
pounds (after a number)	# (e.g., 10#)
registered trademark	®
Trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)

Mathematics, statistics, fisheries

alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	F, t, χ^2, etc.
confidence interval	C.I.
correlation coefficient	R (multiple)
correlation coefficient	r (simple)
covariance	cov
degree (angular or temperature)	°
degrees of freedom	df
divided by	÷ or / (in equations)
equals	=
expected value	E
fork length	FL
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_{2,}$ etc.
mideye-to-tail fork	MEF
minute (angular)	'
multiplied by	x
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
standard length	SL
total length	TL
variance	var

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ABSTRACT

As part of a continuing stock assessment program in Southeast Alaska, the Division of Sport Fish obtained indices of escapement for chinook salmon *Oncorhynchus tshawytscha* in designated streams and transboundary rivers. The estimated total escapement in 2001 was 156,350 large (age .3 and older) chinook, a 69% increase from the escapement of 92,252 fish estimated in 2000. The 2001 estimate was the fourth highest since the start of the escapement index program in 1975.

Eight out of eleven escapement indices increased from 2000, however indices were below escapement goal ranges in only the Blossom River. Estimated age and sex composition and mean length at age of all stocks sampled in 2001 are presented.

Key words: chinook, *Oncorhynchus tshawytscha*, escapement, escapement goals, Taku River, Stikine River, Alsek River, Chilkat River, Unuk River, Chickamin River, Blossom River, Keta River, King Salmon River, Situk River, Andrew Creek, U.S./Canada Treaty, transboundary rivers

INTRODUCTION

Chinook salmon *Oncorhynchus tshawytscha* are known to occur in 34 rivers in, or draining into, the Southeast region of Alaska from British Columbia or Yukon Territory, Canada, (Kissner 1977). In the mid-1970s it became apparent that many of the chinook salmon stocks in this region were depressed relative to historical levels of production (Kissner 1975), and a fisheries management program was implemented to rebuild stocks in Southeast Alaska streams and in transboundary rivers (rivers that originate in Canada and flow into Southeast Alaska coastal waters; (ADF&G Unpublished). Initially, this management program closed commercial and recreational fisheries in terminal and near-terminal areas in U.S. waters.

In 1981, this program was formalized and expanded to a 15-year (roughly 3 life-cycles) rebuilding program for the transboundary Taku, Stikine, Alsek, Unuk, Chickamin, and Chilkat rivers and the non-transboundary Blossom, Keta, Situk, and King Salmon rivers (ADF&G Unpublished) (Figure 1). The program used region-wide, all-gear catch ceilings for chinook salmon, designed to rebuild spawning escapements by 1995 (ADF&G Unpublished). In 1985, the Alaskan program was incorporated into a comprehensive coast-wide rebuilding program for all wild stocks of chinook salmon, under the auspices of the U.S./Canada Pacific Salmon Treaty (PST).

To track the spawning escapement, the Alaska Department of Fish and Game (ADF&G), the Canadian Department of Fisheries and Oceans (DFO), the Taku River Tlingit First Nation (TRTFN), and the Tahltan First Nation (TFN) count spawning chinook salmon in a designated set of eleven watersheds (Appendix A1). These streams were selected on the basis of their historical importance to fisheries, size of the population, geographic distribution, extent of the historical database, and ease of data collection. Counts from each of these streams are considered to be indicators of relative abundance, based on the assumption that counts are a relatively constant proportion of the annual escapement in an index area or watershed.

Programs to estimate total escapement and survey count-to-escapement expansion factors for index counts have been implemented for all 11 index stocks. Long-term annual programs are in place on the Situk, Alsek, Chilkat, Taku, Stikine and Unuk rivers. Short-term (2–3 year) projects were used to estimate expansion factors for the other 5 systems. Estimates of escapement from these mark-recapture and weir studies are generally superior to expanded survey count estimates, and are preferentially employed whenever they are available.

Escapement data are provided annually to the Joint Chinook Technical Committee (CTC) of the Pacific Salmon Commission (PSC), who use them to evaluate the status of the indicator stocks (PSC 1997). Estimates of the total escapement of

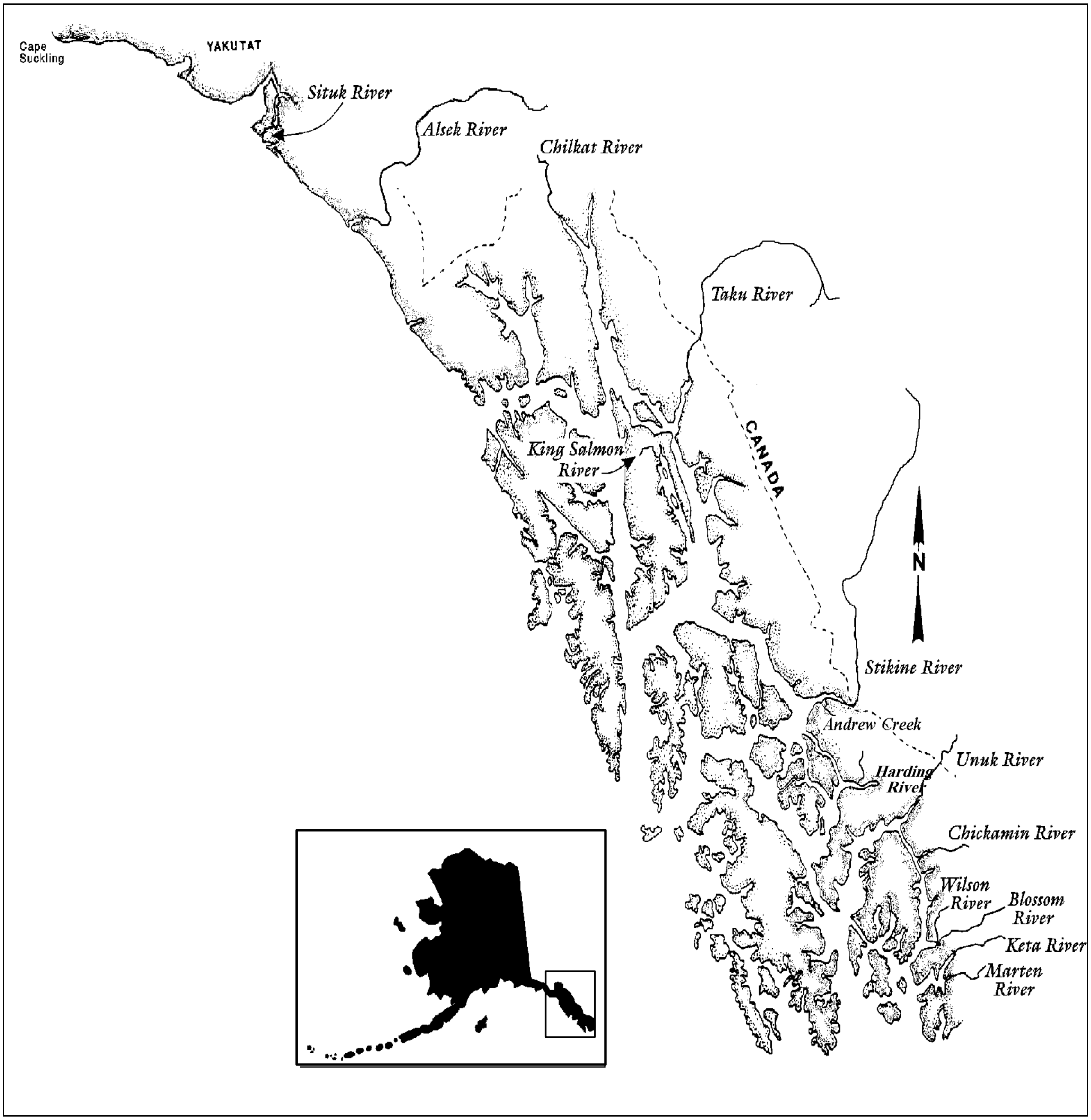

Figure 1.–Location of selected chinook salmon systems in Southeast Alaska, Yakutat, and trans-boundary rivers.

large spawners are provided to the CTC for six stocks (Situk, Chilkat, Taku, Stikine, Andrew and King Salmon rivers) and index counts for the remaining five stocks are used to track trends in escapement.

In addition to these applications, Biological Escapement Goals (BEGs 5AAC 39.222) have been established for 10 of the systems and fisheries are managed to achieve those escapement goal ranges.

This project obtained indices of spawner abundance for major chinook salmon stocks in Southeast Alaska. Objectives for 2001 were to count large (≥660 mm mid-eye to fork length, or ocean-age 3 and older) spawning chinook salmon during the time of peak abundance in tributaries and mainstem areas of the Stikine, Taku, Alsek, Situk, Unuk, Chickamin, Keta, Blossom, King Salmon rivers and in Andrew Creek, and to compile and compare the indices to those from past years.

DESCRIPTION OF STUDY SITES

Many individual spawning areas are surveyed annually in a designated set of watersheds. Detailed descriptions and maps of these areas are found in Mecum and Kissner (1989), and general descriptions of the watersheds are below.

The Taku River originates in northern British Columbia and flows into the ocean 48 km east of Juneau, Alaska. The Taku River drainage covers over 17,000 km^2; average monthly flows range from 60 m^3/sec in February to 1,097 m^3/sec in June (Bigelow et al. 1995). Principal tributaries are the Sloko, Nakina, Sheslay, Inklin, and Nahlin rivers. The clearwater Nakina and Nahlin rivers contribute less than 25% of the total drainage discharge; most is from glacier-fed streams on the eastern slope of the Coast Range of British Columbia. Upstream of the abandoned mining community of Tulsequah, British Columbia, the drainage remains in pristine condition, with very few mining, logging, or other development activities. The upper Taku River area is extremely remote, with no road access and few year-round residents. All of the important chinook salmon spawning areas are in tributaries in the upper drainage in British Columbia.

Stock assessment of chinook salmon has been conducted intermittently on the Taku River since the 1950s, and standardized helicopter surveys of the index areas have been conducted annually since 1973. Survey index areas include portions of the Nakina, Nahlin, Dudidontu, Tatsamenie, and Kowatua rivers and Tseta Creek. In addition, since 1973 the DFO, TRTFN, and ADF&G have operated a carcass collection weir below the major spawning area on the Nakina river, which provides an estimate of the age and size composition of the escapement. Mark-recapture experiments are providing annual independent estimates of total escapement since 1995 (McPherson et al. 1998a, 1999).

The Stikine River originates in British Columbia and flows to the sea approximately 32 km south of Petersburg, Alaska. Its drainage covers about 52,000 km^2, much of which is inaccessible to anadromous fish because of natural barriers and velocity blocks. The Stikine River's principal tributaries include the Tahltan, Chutine, Scud, Iskut, and Tuya rivers. The lower river and most tributaries are glacially occluded (e.g., Chutine, Scud, and Iskut rivers).

Only 2% of the Stikine River drainage is in Alaska (Beak Consultants Limited 1981), and the majority of the chinook salmon spawning areas in the Stikine River are located in British Columbia, Canada, in the mainstem Tahltan and Little Tahltan rivers (including Beatty Creek). However, Andrew Creek, in the U.S. portion of the lower Stikine River, supports a significant run of chinook salmon. The upper drainage of the Stikine is accessible via the Telegraph Creek Road.

Helicopter surveys of the Little Tahltan River index area have been conducted annually since 1975, and the DFO and TFN have operated a fish counting weir at the mouth of the Little Tahltan River since 1985. Counts from the weir represent the total escapement to that tributary. Since 1996, mark-recapture experiments have provided independent estimates of total escapement to the Stikine River (Pahlke and Etherton 1997; 1999; 2000; Pahlke et al. 2000; Der Hovanisian et al. 2001).

Andrew Creek flows into the lower Stikine River in Alaska, not far from the limit of tidal influence. From 1976 to 1984, a weir was operated on Andrew Creek to provide brood stock for hatcheries. Foot, aerial and helicopter surveys to count chinook salmon have been conducted annually since 1985. A new weir was operated on Andrew Creek in 1997 and 1998.

The Alsek River originates in Yukon Territory, Canada, and flows in a southerly direction into the Gulf of Alaska approximately 75 km southeast of Yakutat, Alaska. Its largest tributaries are the Dezadeash and Tatshenshini rivers. The

Alsek River drainage covers about 28,000 km^2 (Bigelow et al. 1995), but much of it, including the mainstem of the Alsek itself, is inaccessible to anadromous salmonids because of velocity barriers. The significant spawning areas for chinook salmon are found mostly in tributaries of the Tatshenshini River, including the Klukshu, Blanchard, and Takhanne rivers and in Village and Goat creeks. The Klukshu and upper Tatshenshini rivers are accessible by road near Dalton Post, Yukon Territory.

Counts of chinook salmon have been collected on the Alsek River since 1962. Beginning in 1976, the DFO has operated a weir at the mouth of the Klukshu to count chinook, sockeye *O. nerka*, and coho salmon O. *kisutch*. The count of chinook salmon through the Klukshu River weir is used as the index for the Alsek River. Some aboriginal harvest takes place above the weir. Aerial surveys to count spawning chinook salmon have been conducted by ADF&G with a helicopter since 1981. Prior to 1981, surveys were made from fixed-wing aircraft. The escapement to the Klukshu River is difficult to count by aerial, boat or foot surveys because of deep pools and overhanging vegetation. However, surveys of the Klukshu River are conducted annually to provide some continuity in estimates in the event that funding for the weir is discontinued. The Blanchard and Takhanne Rivers and Goat Creek, three smaller tributaries of the Tatshenshini River, are also surveyed annually, but are not used to index escapements. In 1998, a mark-recapture and radio telemetry study was conducted to estimate the escapement and distribution of spawning chinook salmon in the Alsek River (Pahlke et al. 1999) and the mark-recapture experiment has continued annually (Pahlke and Etherton 2001a; 2001b; 2002).

The Unuk, Chickamin, Blossom, and Keta river drainages all feed into Behm Canal—a narrow passage of water east of Ketchikan, Alaska. Misty Fiords National Monument/ Wilderness Area surrounds the eastern or "back" Behm Canal and includes the Boca de Quadra fjords. Many of the mainland rivers in the area support chinook salmon; the Unuk, Chickamin, Blossom and Keta rivers are designated chinook salmon escapement index systems.

The Unuk River originates in a glaciated area of British Columbia and flows 129 km to Burroughs Bay, 85 km northeast of Ketchikan, Alaska; only the lower 39 km of the river are in Alaska. The Unuk is a large braided, glacially occluded river with a drainage of approximately 3,885 km^2. Most (~85%) spawning occurs in tributaries of the Alaska portion of the river (Pahlke et al. 1996). The escapement index areas are all small clear-water tributaries: Eulachon River and Cripple, Genes Lake, Clear, Lake, and Kerr creeks. Cripple Creek and Genes Lake Creek cannot be surveyed by air because of heavy vegetation, so fish are counted by foot survey. Chinook salmon have been counted annually by foot or helicopter surveys in these areas since 1977. Chinook salmon have been periodically counted in Boundary Creek, but survey conditions there are often poor and the counts are not included in the index. Total escapement was estimated by a mark-recapture project in 1994 (Pahlke et al. 1996) and annually since 1997 (Jones III et al. 1998a; Jones III and McPherson 1999, 2000; Weller and McPherson *in prep*).

The Chickamin River is a large, glacial river that originates in British Columbia, and flows into Behm Canal approximately 32 km southeast of Burroughs Bay and 65 km north-east of Ketchikan. Although it is technically a transboundary river, there are no chinook spawning areas on the Chickamin River upstream from the Canadian border (Pahlke 1997a). Important spawning tributaries are the South Fork of the Chickamin and Barrier, Butler, Indian, Leduc, Humpy, King, and Clear Falls creeks. Chinook salmon have been counted by foot or helicopter surveys in index areas of the Chickamin River each year since 1975. Total escapement was estimated by mark-recapture projects in 1995, 1996 and 2001, and spawning distribution was estimated by radio-telemetry in 1996 (Pahlke 1996; Pahlke 1997a; Freeman and McPherson *in prep*).

The Blossom, Keta, Wilson, and Marten rivers are non-transboundary rivers that flow into Behm Canal approximately 45 km east of Ketchikan. These rivers lie inside the boundaries of the Misty Fiords National Monument in southern Behm Canal but are within an area that has been specifically excluded from Wilderness designation, because of the potential development of a large-scale molybdenum mine (Quartz Hill) near the divide of the Blossom and Keta rivers. The mine is presently undeveloped, but an access road has been completed; it terminates at salt water near the mouth of the Blossom River.

The Keta River drainage covers about 192 km^2 and the Blossom about 176 km^2 (Bigelow et al. 1995) and have been surveyed by helicopter annually since 1975. Chinook salmon escapements to the Wilson and Marten rivers have been monitored on an intermittent basis in recent years. Mark-recapture experiments were conducted in 1998 to estimate the escapement of chinook salmon in the Blossom and Keta rivers (Brownlee et al. 1999) and were repeated on the Keta River in 1999 and 2000 (Freeman et al. 2000; 2001).

The King Salmon River drains an area of approximately 100 km^2 on Admiralty Island, flowing into King Salmon Bay on the eastern side of Stephens Passage about 48 km south of Juneau. The King Salmon River is the only island river system in Southeast Alaska to support more than 100 spawning chinook salmon. ADF&G operated a weir on the King Salmon River from 1983 through 1992 to count chinook salmon and collect broodstock for Snettisham Hatchery. Helicopter surveys have been conducted annually since 1975 and foot surveys since 1992.

The Chilkat River is a large glacial river which originates in Yukon Territory, Canada, and flows into Chilkat Inlet at the head of northern Lynn Canal near Haines, Alaska. Helicopter and foot surveys are an ineffective index of abundance for this system (Johnson et al. 1992) and were suspended in 1993, in favor of annual estimates of escapement using mark-recapture methods. Total escapement has been estimated annually since 1991 (Ericksen 2002).

The Situk River is located about 16 km east of Yakutat, Alaska. The Situk supports a large run of sockeye salmon which are harvested in commercial and subsistence set gillnet fisheries concentrated at the mouth of the Situk River. Situk River chinook salmon are harvested both incidentally and targeted in the set gillnet fisheries, depending on run strength, and in a recreational fishery in the river. A weir was operated on the Situk River at the upper limit of the intertidal area from 1928 to 1955 to count all five species of Pacific salmon spawning in the river. Since 1976, a weir has been operated primarily to count chinook and sockeye salmon. The proportion of the recreational harvest above the weir varies from year to year (Howe et al. 2001).

METHODS

There are 34 river systems in the region (Figure 1) with populations of wild chinook salmon. Three transboundary rivers, the Taku, Stikine, and Alsek, are classed as major producers—each with potential production (harvest plus escapement) greater than 10,000 fish (Kissner 1975). Nine rivers are classed as medium producers, each with production of 1,500 to 10,000 fish. The remaining 22 rivers are minor producers, with production less than 1,500 fish. Small numbers of chinook salmon occur in other streams of the region but they are not included in the above list because successful spawning has not been documented. Chinook salmon are counted via aerial surveys or at weirs each year in all three major producing systems, in six of the medium producers, and in one minor producer (Appendix A2). Abundance in the Chilkat River is estimated only by a mark-recapture program. These index systems, along with the Chilkat River, are believed to account for about 90% of the total chinook salmon escapement in Southeast Alaska and transboundary rivers.

ESCAPEMENT GOALS

The initial rebuilding program established interim escapement goals in 1981 for nine systems: the Alsek, Taku, Stikine, Situk, King Salmon, Unuk, Chickamin, Keta and Blossom/Wilson rivers. Although the aim was to have escapement goals that provided the optimal level of harvest, little data were available to produce such goals. As a result, escapement goals were originally set based on the highest observed escapement count prior to 1981 (Pahlke 1997b). Goals for the Chilkat River and Andrew Creek were added in 1985, bringing the total number of regularly monitored river systems to eleven. Pahlke (1997b) provides detailed descriptions of the escapement goals and their origins. Escapement goals have been revised when sufficient new information warrants. Most of the revised escapement goals have been developed with spawner-recruit analysis, as ranges of optimum escapement rather than a single point estimate (Appendix A1). Spawner-recruit analysis requires not only a long series of escapement estimates, but also annual age and sex-specific estimates of escapement (McPherson and Carlile 1997). The United States Section of the CTC developed data standards in 1997 for stock specific assessments of escapement, terminal runs, and forecasts of abundance which are used to evaluate existing stock assessment programs (PSC 1997). This data has been collected routinely at weirs and during mark-recapture studies and recently specific programs have been implemented to collect age, sex and length data from chinook salmon in the Blossom, Chickamin, and King Salmon rivers and Andrew Creek.

Indices of Escapement

Spawning chinook salmon are counted at 26 designated index areas in nine of the systems; total escapement in the other two systems are estimated by complete counts of chinook salmon at the Situk River weir and by annual mark-recapture estimates on the Chilkat River. Counts are made during aerial or foot surveys during periods of peak spawning, or at weirs. Peak spawning times, defined as the period when the largest number of adult chinook salmon actively spawn in a particular stream or river, are well-documented from surveys of these index areas conducted since 1976 (Kissner 1982; Pahlke 1997b). The proportion of fish in pre-spawning, spawning and post-spawning condition is used to judge whether the survey timing is correct to encompass peak spawning. Index areas are surveyed at least twice unless turbid water or unsafe conditions preclude the second survey. Survey conditions on each index survey are rated as poor, normal or excellent for that particular index area. Factors that affect the rating include water level, clarity, light conditions, and weather.

Only large (typically age-.3, -.4, and -.5) chinook salmon, $\geq$660 mm mideye-to-fork length (MEF), are counted during aerial or foot surveys. No attempt is made to accurately count small (typically age-.1 and -.2) chinook salmon <660 mm (MEF) (Mecum 1990). These small chinook salmon, also called jacks, are early maturing, precocious males considered to be surplus to spawning escapement needs. They are easy to separate visually from their older age counterparts under most conditions, because of their short, compact bodies and lighter color. They are, however, difficult to distinguish from other smaller species such as pink *O. gorbuscha* and sockeye salmon. In some systems age- 1.2 fish may be larger than 660 mm MEF and be difficult to avoid counting.

Aerial surveys are conducted from a Bell 206 or Hughes 500D helicopter. Pilots are directed to fly the helicopter from 6 to 15 meters above the riverbed at a speed of 6–16 km/h. The helicopter door on the side of the observer is removed, and the helicopter is flown sideways while observations of spawning chinook salmon are made from the open space. Foot surveys are conducted by at least two people walking in the creek bed or on the riverbank.

Weather, distances involved, run timing, etc., can make it difficult for a single surveyor to complete all the index surveys annually under normal or excellent conditions. Thus, alternate surveyors are selected to conduct the counts when the primary surveyor is unavailable. Also, new surveyors take on primary responsibilities at infrequent intervals. Since between-observer variability and bias can be significant (Jones III et al. 1998b), new surveyors must be trained and calibrated against the primary surveyor to provide consistency and continuity in the data. Alternate observers accompany the primary observer on regularly scheduled surveys to learn survey methods and counting techniques (training flights). Each alternate observer also accompanies the primary observer on additional regularly scheduled surveys to independently count chinook salmon (calibration flights). Each calibration flight consists of two passes over the index area so the two observers in turn sit in the preferred location in the helicopter during one pass along the river. Counts are not shared during the calibration surveys, but are shared and discussed following the completion of the second pass of each flight. Calibration data will be collected annually for several years. The relation-ship between observer escapement counts will be determined from accumulated data and applied to counts as appropriate.

Several index areas are routinely surveyed by more than one method; e.g. Andrew Creek is surveyed from airplanes, helicopters and by foot. The various surveys are conducted as close as possible to each other to promote comparison and calibration of the different methods.

Counts and other observations from the 2001 surveys (Appendix A3) are entered into the ADF&G CFMD Integrated Fisheries Database (IFDB) in Juneau for archiving and general distribution.

Estimates of total escapement are needed to model total production, exploitation rates and other population parameters. To estimate escapement (since indices are only a partial count of spawning abundance), counts from index areas are increased by an expansion factor (Table 1). An expansion factor is an estimate of the proportion of the season's total escapement counted in a river system during the peak spawning period. Expansion factors are based on comparisons with weir counts, mark-recapture estimates, and spawning distribution studies. They vary among rivers according to how complete the coverage of spawning areas is and difficulties encountered in observing spawners, such as overhanging vegetation, turbid water conditions, presence of other salmon species (i.e., pink and chum *O. keta* salmon), or protraction of run timing. Expansion factors range from 1.5 for the King Salmon River to 5.2 for the Taku River (Table 1).

Escapement counts are obtained from a fish-counting weir on the Situk River and a mark-recapture program on the Chilkat River. Survey expansions are not necessary for those streams where weirs or other estimation programs are used to count all migrating chinook salmon.

Finally, to estimate total regional escapement, escapement estimates from the 11 index systems are expanded to account for the unsurveyed systems. (Appendix A2). Presently, we believe the total estimated escapement in the index areas represents approximately 90% of the region total. Escapement estimates for the Chilkat River are not available prior to 1991. From 1991 to 1997 the estimated escapement to the Chilkat River averaged 6% of the estimated regionwide total. Therefore, prior to 1991 the expanded index counts represent approximately 84% of the estimated Southeast Alaska total escapement.

Expansion factors for individual rivers have been revised, based on results from experiments to estimate total escapement and spawning distribution. For example, estimated total escapement and radio-tracking distribution data were used to revise tributary expansion factors for the Taku and Unuk rivers (Pahlke and Bernard 1996; Pahlke et al. 1996 and McPherson et al. 1998a). Mark-recapture studies to estimate spawning abundance on the Unuk River in 1994 (Pahlke et al. 1996) and on the Chickamin River in 1995 and 1996 (Pahlke 1996; 1997a) were used to revise expansion factors for those two rivers in 1996; results were also applied to the nearby Blossom and Keta rivers. On Andrew Creek, a weir was operated over four years (1979, 1981, 1982, and 1984), during which index counts were also made, establishing a new expansion factor for that system in 1995. Also in 1997, ten years (1983–1992) of matched weir and index counts were used to revise the expansion factor for the King Salmon River (McPherson and Clark *in prep*). The expansion factors for the Taku River were revised in 1996 and again in 1999 based on the results of mark-recapture studies (Pahlke and Bernard 1996, McPherson et al. 2000).

These studies have helped to estimate total escapement in the region and have shown that, in most cases, the surveyed index areas provide reasonably accurate trends in escapements. However, Johnson et al. (1992) demonstrated that expansion factors used before 1991 on the Chilkat River system were highly inaccurate, because the index areas received less than 5% of the escapement. Consequently, since 1991, escapement to the Chilkat River has been estimated annually by mark-recapture experiments (Ericksen 2002). Studies on the Taku, Stikine, Alsek, Unuk, Chickamin, Blossom, Keta and King Salmon rivers, as well as on Andrew Creek,

Table 1.–Peak survey counts, survey expansion factors, estimated total escapement from expanded survey counts, mark-recapture projects or weir, for large chinook salmon returning to Southeast Alaska and transboundary rivers in 2001.

	Survey area	Survey count	Survey expansion factor	Survey expansion estimated escapement [a]	Estimated total escapement (M-R or weir) [b]	Reference[c]
Major producers						
Alsek River	Klukshu	1,825	5.0	9,038 [d]	11,022	Pahlke and Etherton 2002
Taku River	5 tributaries	5,040	5.2	26,208	41,179	Jones III and McPherson *in prep*
Stikine River	Little Tahltan	9,730	5.15	50,110	63,523	Der Hovanisian et al. 2003
Category subtotal				85,356	115,724	
Medium producers						
Situk River	NA	NA	NA	NA	656 [e]	
Chilkat River	NA	NA	NA	NA	4,517	Ericksen 2002
Andrew Cr.	All	1,054	2.0	2,108	NA	
Unuk River	6 tributaries	2,019	5.0[g]	10,095	10,541	Weller and McPherson *in prep*
Chickamin River	8 tributaries	1,010	5.17[g]	5,222	5,177	Freeman and McPherson *in prep*
Blossom River	All	204	4.0[g]	816	NA	
Keta River	All	343	3.0[g]	1,029	NA	
Category subtotal					24,844	
Minor producers						
King Salmon R.	All	98	1.5	147	NA	
Index system total					140,715	M-R plus survey expansions
Region total			1/0.9		156,350	

[a] Estimated by multiplying survey count by expansion factor.

[b] Estimated from mark-recapture program or weir count. Final numbers used for ADF&G management.

[c] Reference document for mark-recapture estimate.

[d] Klukshu weir count × 5 minus aboriginal fishery harvest above weir (87).

[e] Situk River weir count, minus estimated sport harvest above weir (45).

[f] Mark-recapture estimates used instead of expansion factors.

[g] Unuk, Chickamin, Blossom and Keta River expansion factors revised 2002.

have shown that the index expansion factors used on those systems were much more accurate than those used on the Chilkat (PSC 1991, Pahlke 1996; 1997a). Expansion factors will continue to be revised as additional data become available. Ongoing research projects should provide more information on the expansion factors for the Taku, Stikine, Unuk, Chickamin, and Alsek rivers. Estimates of escapement from expanded counts are included in this document to provide relative estimates of total spawner abundance over time, with the caveat that expansion factors may produce incorrect estimates or be revised in the future.

AGE, SEX, AND LENGTH COMPOSITION OF ESCAPEMENTS

I compiled estimates of escapement by age and sex for all 11 systems having chinook salmon stock assessment projects in Southeast Alaska in 2001 (Appendix A4) to provide a basic statistical summary for managers and researchers. Estimates for the Chickamin, Unuk, Stikine, Taku, Chilkat and Alsek rivers were the results of mark-recapture experiments (Der Hovanisian et al. 2003; Ericksen 2002; Freeman and McPherson *in prep*; Pahlke and Etherton 2002;

Weller and McPherson *in prep*; Jones III and McPherson *in prep*). Results compiled from each of these projects are the reported unbiased estimates of escapement of medium- and large-sized chinook salmon, except for the Stikine River, where the unbiased estimates include small fish. Size classification of small and medium fish varies slightly between projects. Estimates for medium and large fish from the Situk River are based on age sampling and a total census of the escapement at a weir. Age composition estimates for the Blossom, Keta, and King Salmon rivers and Andrew Creek were calculated by dividing the peak survey count by the escapement expansion factor (Table 1), and multiplying the result by the age composition of the escapement sampled on the spawning grounds of each drainage in 2001. Standard errors have not been estimated for these numbers because of the short series of data upon which the expansion factors are based. Note that the survey index counts for the Blossom and Keta are assumed to include many age 1.2 chinook salmon because their large size makes them virtually indistinguishable from the large sized fish targeted for counting. For this reason, all fish sampled on the spawning grounds (most are age 1.2 and older) are used in the calculations reported in Appendix A4. Also note that while there was no way to investigate size or sex selective sampling in these spawning ground samples, the various techniques used have been applied in similar quantitative experiments and are expected to provide unbiased and reliable results when sample sizes are adequate.

Estimates of mean length by sex and age and their estimated variances were also calculated for each system (Appendix A5). These estimates are either the unbiased estimates reported in the publications cited above, or made using the spawning ground samples as noted above.

RESULTS

In 2001, 43 locations, 25 of which were designated index areas, were surveyed specifically for chinook salmon escapement (Appendix A3). Surveys generally progressed as planned.

From 1984 to 1993, the estimated escapement of chinook salmon in Southeast Alaska increased steadily for 10 years, peaking in 1993 (Appendix A2). This was due primarily to strong returns to the Taku, Stikine, and Chilkat rivers, which together make up over 75% of the summed escapement goals in the region. Escapements declined in 1994 and 1995 and then peaked again in 1996 and 1997 as a result of record high escapements in the Taku River. In 1998 and 1999 escapements to the Taku River declined dramatically and have remained relatively low, but escapement to the Stikine River has increased greatly, to the highest on record in 2001.

The estimated escapement (expanded) of large chinook salmon for all Southeast Alaska and transboundary rivers in 2001 was 156,350 (Table 1), a 69% increase from the estimated 92,252 fish in 2000. The estimates for 2000 were revised with updated estimates. The estimated total for the region increased, primarily due to increases in escapements to the Taku, Stikine, and Unuk rivers.

TAKU RIVER

The count of 5,040 large chinook salmon in the five index areas of the Taku River was a decrease over the escapement in 2000 (Table 2) with counts in four tributaries below average (Table 3). Counts increased steadily from 1983 to 1993, and exceeded the upper limit of the BEG five times in the 90s (Figure 2).

The sum of counts from the five index areas was expanded by a survey expansion factor of 5.2. The expansion factor was revised in 1999 based on five years of mark-recapture experiments on the Taku River (Table 4) (McPherson et al. 2000). McPherson et. al recommend an escapement goal range of 30,000 to 55,000 large spawners. These changes were adopted by the Transboundary River Technical Committee (TBTC) and the Chinook Technical Committee (CTC) of the PSC. The revised PSC goal uses counts in five index areas expanded by 5.2 which corresponds to an index goal range of 5,800 to 10,600 fish. Expansion of the survey counts of 5,040 by 5.2 results in an escapement estimate of 26,208 large chinook salmon in 2001. A mark-recapture experiment conducted in 2001 resulted in a much higher escapement estimate (45,833; 41,179 large; SE = 6,236; Jones III and McPherson *in prep*).

Table 2.–Counts of spawning chinook salmon in index areas of the Taku River, 1951–2001.

Year[a]	Nakina River		Nahlin River		Kowatua River		Tatsamenie River		Dudidontu River		5 Trib. total	Tseta Creek[f]	
1951	5,000	(F)[b]	1,000	(F)	–		–		400	(F)	6,400	100	(F)
1952	9,000	(F)	–		–		–		–		9,000		
1953	7,500	(F)	–		–		–		–		7,500		
1954	6,000	(F)	–	(F)	–		–		–		6,000		
1955	3,000	(F)	–		–		–		–		3,000		
1956	1,380	(F)	–		–		–		–		1,380		
1957	1,500[c]	(F/W)	–		–		–		–		1,500		
1958	2,500[c]	(F/W)	2,500	(A)	–		–		4,500	(A)	9,500		
1959	4,000[c]	(F/W)	–		–		–		–		4,000		
1962	–		216	(A)	–		–		25	(A)	241	81	(A)
1965	3,050	(H)	35	(A)	200	P(A)	50	P(A)	110	(A)	3,445	18	(A)
1966	3,700	P(A)	300	(A)	14	P(A)	100	P(A)	252	(A)	4,366	151	(A)
1967	700	(A)	300	P(A)	250	P(A)	–		600	(A)	1,850	350	(A)
1968	300	P(A)	450	(A)	1,100	(A)	800	E(A)	590	(A)	3,240	230	(A)
1969	3,500	(A)	–		3,300	(A)	800	E(A)	–		7,600	–	
1970	–		26	(A)	1,200	P(A)	530	E(A)	10	(A)	1,766	25	(A)
1971	500	(A)	473	(A)	1,400	E(A)	360	E(A)	165	(A)	2,898	–	(A)
1972	1,000	(F)	280	(A)	170	(A)	132	(A)	102	(A)	1,684	80	P(A)
1973	2,000	N(H)	300	E(H)	100	N(H)	200	E(H)	200	E(H)	2,800	4	(A)
1974	1,800	E(H)	900	E(H)	235	(A)	120	(A)	24	(A)	3,079	4	(A)
1975	1,800	E(H)	274	E(H)	–		–		15	N(H)	2,089	–	
1976	3,000	E(H)	725	E(H)	341	P(A)	620	E(H)	40	(H)	4,726	–	
1977	3,850	E(H)	650	E(H)	580	E(A)	573	E(H)	18	(H)	5,671	–	
1978	1,620	E(H)	624	E(H)	490	N(H)	550	E(H)	–		3,284	21	E(H)
1979	2,110	E(H)	857	E(H)	430	N(H)	750	E(H)	9	E(H)	4,156	–	
1980	4,500	E(H)	1,531	E(H)	450	N(H)	905	E(H)	158	E(H)	7,544	–	
1981	5,110	E(H)	2,945	E(H)	560	N(H)	839	E(H)	74	N(H)	9,528	258	N(H)
1982	2,533	E(H)	1,246	E(H)	289	N(H)	387	N(H)	130	N(H)	4,585	228	N(H)
1983	968	E(H)	391	N(H)	171	E(H)	236	E(H)	117	E(H)	1,883	179	N(H)
1984[d]	1,887	(H)	951	(H)	279	E(H)	616	E(H)	–		3,733	176	(H)
1985	2,647	N(H)	2,236	E(H)	699	E(H)	848	E(H)	475	(H)	6,905	303	E(H)
1986	3,868	(H)	1,612	E(H)	548	E(H)	886	E(H)	413	E(H)	7,327	193	E(H)
1987	2,906	E(H)	1,122	E(H)	570	E(H)	678	E(H)	287	E(H)	5,563	180	E(H)
1988	4,500	E(H)	1,535	E(H)	1,010	E(H)	1,272	E(H)	243	E(H)	8,560	66	E(H)
1989	5,141	E(H)	1,812	E(H)	601[e]	(W)	1,228	E(H)	204	E(H)	8,986	494	E(H)
1990	7,917	E(H)	1,658	E(H)	614[e]	(W)	1,068	N(H)	820	E(H)	12,077	172	N(H)
1991	5,610	E(H)	1,781	E(H)	570	N(H)	1,164	E(H)	804	E(H)	9,929	224	N(H)
1992	5,750	E(H)	1,821	E(H)	782	E(H)	1,624	N(H)	768	N(H)	10,745	313	N(H)
1993	6,490	E(H)	2,128	N(H)	1,584	E(H)	1,491	E(H)	1,020	E(H)	12,713	491	N(H)
1994	4,792	N(H)	2,418	E(H)	410	P(H)	1,106	N(H)	573	N(H)	9,299	614	E(H)
1995	3,943	E(H)	2,069	E(H)	550	N(H)	678	N(H)	731	E(H)	7,971	786	E(H)
1996	7,720	E(H)	5,415	E(H)	1,620	N(H)	2,011	N(H)	1,810	N(H)	18,576	1,201	N(H)
1997	6,095	E(H)	3,655	E(H)	1,360	N(H)	1,148	N(H)	943	N(H)	13,201	648	N(H)
1998	2,720	E(H)	1,294	N(H)	473	N(H)	675	E(H)	807	E(H)	5,969	360	E(H)
1999	1,900	N(H)	532	N(H)	561	E(H)	431	N(H)	527	E(H)	3,951	221	N(H)
2000	2,907	N(H)	728	P(H)	702	N(H)	953	N(H)	482	N(H)	5,772	160	N(H)
2001	1,552	P(H)	935	N(H)	1,050	N(H)	1,024	N(H)	479	N(H)	5,040	202	N(H)
91–00 Average	4,793		2,184		861		1,128		847		9,813	502	

[a] Counts before 1975 may not be comparable due to changes in survey dates and methods; foot surveys may include jacks.

[b] (F) = foot survey, — = no survey conducted, (A) = fixed-wing aircraft, (H) = helicopter, P = survey conditions hampered by glacial or turbid waters, N = normal water flows and turbidity–average survey conditions, E = survey conditions excellent.

[c] Partial survey of Nakina River in 1957–59; comparisons made from carcass weir (W) counts.

[d] Surveys in 1984 conducted by DFO; partial survey of Tseta Creek and Nahlin.

[e] Carcass weir at Kowatua River used to partially count escapement due to unfavorable water conditions, 1989, 1990.

[f] Tseta Creek removed from index areas in 1999.

Table 3.–Distribution of spawning chinook salmon among index areas of the Taku River during years when all index areas were surveyed.

Year	Nakina River	%	Nahlin River	%	Kowatua River	%	Tatsamenie River	%	Dudidontu River	%	Tseta Creek	%	Total
1981	5,110	52	2,945	30	560	6	839	9	74	1	258	3	9,786
1982	2,533	53	1,246	26	289	6	387	8	130	3	228	5	4,813
1983	968	47	391	19	171	8	236	11	117	6	179	9	2,062
1985	2,647	37	2,236	31	699	10	848	12	475	7	303	4	7,208
1986	3,868	51	1,612	21	548	7	886	12	413	5	193	3	7,520
1987	2,906	51	1,122	20	570	10	678	12	287	5	180	3	5,743
1988	4,500	52	1,535	18	1,010	12	1,272	15	243	3	66	1	8,626
1989	5,141	54	1,812	19	601	6	1,228	13	204	2	494	5	9,480
1990	7,917	65	1,658	14	614	5	1,068	9	820	7	172	1	12,249
1991	5,610	55	1,781	18	570	6	1,164	11	804	8	224	2	10,153
1992	5,750	52	1,821	16	782	7	1,624	15	768	7	313	3	11,058
1993	6,490	49	2,128	16	1,584	12	1,491	11	1,020	8	497	4	13,210
1994	4,792	48	2,418	24	410	4	1,106	11	573	6	614	6	9,913
1995	3,943	45	2,069	24	550	6	678	8	731	8	786	9	8,757
1996	7,720	39	5,415	27	1,620	8	2,011	10	1,810	9	1,201	6	19,777
1997	6,095	44	3,655	26	1,360	10	1,148	8	943	7	648	5	13,849
1998	2,720	43	1,294	20	473	7	675	11	807	13	360	6	6,329
1999	1,900	46	532	13	561	13	431	10	527	13	221	5	4,172
2000	2,907	49	728	12	702	12	953	16	482	8	160	3	5,932
Average	4,478	49	1,982	21	721	8	987	11	597	7	385	4	9,150
2001	1,552	30	935	18	1,050	20	1,024	20	479	9	202	4	5,242

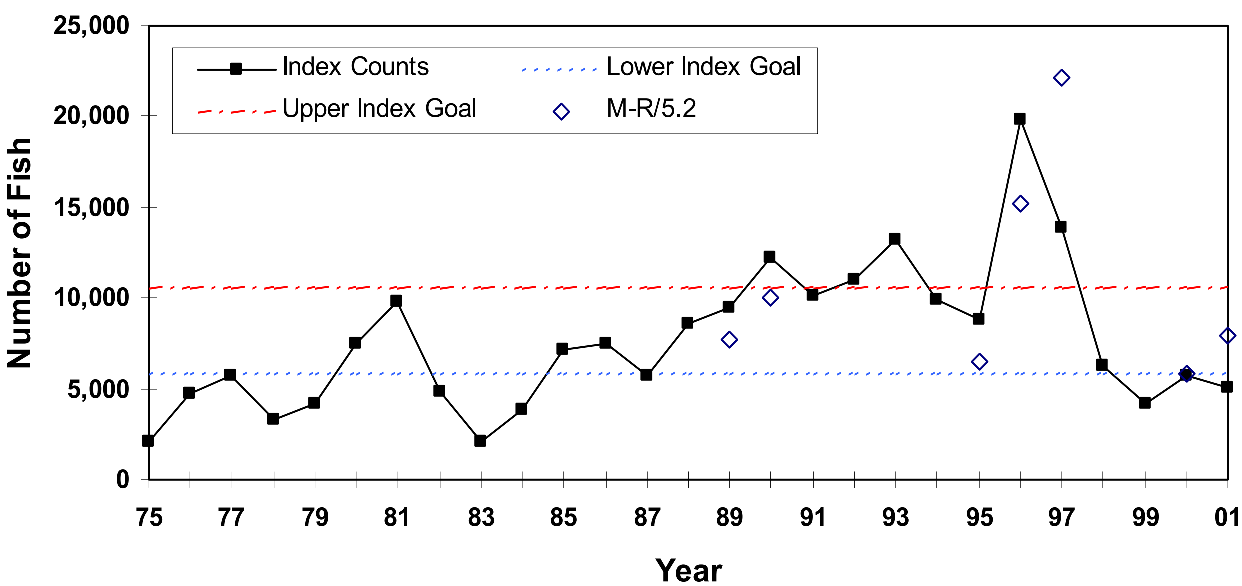

Figure 2.–Counts of chinook salmon in index areas of the Taku River, 1975–2001 and mark-recapture estimates divided by expansion factor of 5.2. Lines show upper and lower limits of index escapement goal range.

Table 4.–Taku River index counts, mark-recapture estimates of escapement, and percent of escapement observed.

Year	Counts[a]	M-R	SE	% Observed
1989	8,986	40,329	5,646	22.3
1990	12,077	52,142	9,326	23.2
1995	7,971	33,805	5,060	23.6
1996	18,576	79,019	9,048	23.5
1997	13,201	114,938	17,888	11.5
Average	12,162	64,047		19.0
1998	5,969	not available		
1999	3,951	not available		
2000	5,772	30,529	5,417	19.2
2001	5,040	41,179	6,236	15.1

[a] Sum of five tributaries, not 6 as prior to 1999.

The big difference in the two estimates is probably a result of poor survey conditions on the Nakina River in 2001. On the average the count in the Nakina River makes up 49% of the total, while in 2001 it was only 30% of the total (Table 3).

Age, sex and length data were collected from carcasses at the Nakina, Nahlin, and Tatsamenie rivers, and live fish were sampled with angling gear at the Nahlin and Tatsamenie rivers (Appendix A4H; A5H).

STIKINE RIVER

At the Little Tahltan River weir 9,730 large chinook salmon were counted in 2001. The weir count was 146% of the count of 6,640 in 2000 and above the 1991–2000 average of 5,863 (Table 5). Aerial surveys of Beatty Creek and the mainstem Tahltan River were discontinued as recommended in Bernard et al. (2000).

The peak aerial survey flown in 2001 obtained a count of 4,158 large chinook salmon above the Little Tahltan River weir. The peak survey count was 42.7% of the total escapement through the weir. From 1985 to 1999, the proportion of the total escapement of chinook salmon counted during peak aerial surveys has ranged from 28.4% to 56.6% and averaged 37.9% (Table 5). The proportion of the total escapement observed in a single survey often declined after the peak of spawning as fish died or were removed by predators. In 1998 and 1999, survey conditions were not unusual and there is no explanation for the lower than average proportion of escapement observed.

Table 5.–Counts of spawning chinook salmon in the Little Tahltan River, Stikine River, 1975–2001.

Year	Weir count	Above-weir catch[b]	Escape-ment	Aerial survey: Peak count[a, c]		Aerial survey: Percent counted
1975	-			700	E(H)	
1976	-			400	N(H)	
1977	-			800	P(H)	
1978	-			632	E(H)	
1979	-			1,166	E(H)	
1980	-			2,137	N(H)	
1981	-			3,334	E(H)	
1982	-			2,830	N(H)	
1983	-			594	E(H)	
1984	-			1,294	(H)	
1985	3,114	0	3,114	1,598	E(H)	51.3
1986	2,891	0	2,891	1,201	E(H)	41.5
1987	4,783	0	4,783	2,706	E(H)	56.6
1988	7,292	0	7,292	3,796	E(H)	52.1
1989	4,715	0	4,715	2,527	E(H)	53.6
1990	4,392	0	4,392	1,755	E(H)	40.0
1991	4,506	0	4,506	1,768	E(H)	39.2
1992	6,627	0	6,627	3,607	E(H)	54.4
1993	11,449	12	11,437	4,010	P(H)	35.1
1994	6,387	14	6,373	2,422	N(H)	38.0
1995	3,072	0	3,072	1,117	N(H)	36.4
1996	4,821	0	4,821	1,920	N(H)	39.8
1997	5,557	10	5,547	1,907	N(H)	34.4
1998	4,879	6	4,873	1,385	N(H)	28.4
1999	4,738	0	4,738	1,379	N(H)	29.1
2000	6,640	9	6,631	2,720	N(H)	41.0
91-00 Avg.	5,863	4	5,863	2,224		37.9
2001	9,730	0	9,730	4,158	N(H)	42.7

[a] (F) = foot survey; N = normal survey conditions; (H) = helicopter survey; P = survey conditions hampered by glacial or turbid waters; E = excellent survey conditions; — = no survey conducted .

[b] Above weir harvest includes broodstock collection and Aboriginal fishery catch.

[c] Peak count equals peak survey above weir plus count below weir on that date.

Age, sex and length data was collected from 1,332 fish sampled at the Little Tahltan River weir and from 478 post-spawning and dead fish sampled at Verrett Creek (Appendix A4E, A5E).

Based on a stock-recruit model, the BEG was revised in 1999 to a range of 14,000 to 28,000 large chinook total in the Stikine River drainage or 2,700 to 5,300 at the Little Tahltan weir (Bernard et al. 2000). The 2001 weir count was above the revised escapement goal range for the Little Tahltan River, which has been met or exceeded every year since the weir was installed in 1985 (Figure 3). Expansion of the 2001 Little Tahltan weir count of 9,730 large chinook salmon by the survey expansion factor (5.15) produced a total Stikine River escapement estimate of 50,110 large chinook salmon. The estimate of total escapement to the Stikine River from a mark-recapture experiment conducted in 2001 is 65,277 (SE = 6,016; 63,523 large; Der Hovanisian et al. 2003) which is over twice the upper end of the escapement goal range for the drainage.

ANDREW CREEK

The 2001 survey count of chinook salmon in Andrew Creek was 1,054 fish, compared to 690 in 2000 (Table 6). In 1998, a spawner recruit analysis was completed and a biological escapement goal range of 650 to 1,500 total (~325-750 index count) large spawners was adopted (Clark et al. 1998). Since 1985, Andrew Creek escapements have exceeded the lower limit of the goal in all but two years (Figure 4).

From 1976 to 1984 a weir was operated on Andrew Creek to provide brood stock for hatcheries. Total spawners removed from the creek ranged from 12 in 1978 to 275 in 1982 (Pahlke 1995). Surveys were also conducted on the system during four of those years and, on the basis of those paired counts, the survey expansion factor was revised in 1995 from 1.6 (1/.625) to 2.0 (see Table 1). No survey expansion was necessary for the years when the weir provided total escapement counts (Appendix A2).

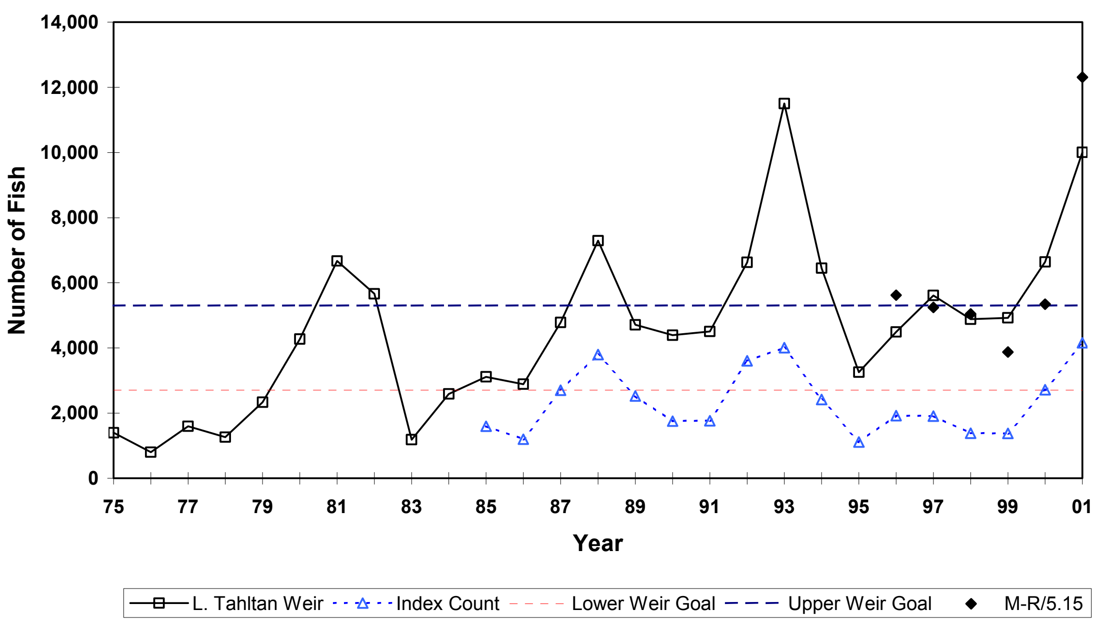

Figure 3.–Counts of chinook salmon at the Little Tahltan River weir, Stikine River, 1975–2001. Mark-recapture estimates divided by expansion factor of 5.15. Data for 1985–2000 from weir counts, 1975–1984 estimated by doubling index count. Lines show upper and lower limits of escapement goal range.

Table 6.–Counts of spawning chinook salmon in selected rivers in central Southeast Alaska, 1956–2001. (A) = survey conducted by fixed-wing aircraft; — = no survey conducted or data not comparable; (F/A) = combined foot and aerial count; (F) = survey conducted by walking; (H) = survey conducted by helicopter; (W/F) = weir and foot count; N = normal conditions; E = excellent conditions; P = poor conditions; (B) = escapement surveyed from boat.

											Bradfield River			
Year	**Andrew Cr.**[a]		**North Arm**		**Clear Creek**		**Harding River**		**Aaron Creek**		N. Fork		E. Fork	
1956	4,500	(A)	–		–		–		–		–		–	
1957	3,000	(F/A)	–		–		–		–		–		–	
1958	2,500	(F/A)	–		–		–		–		–		–	
1959	150	(F/A)	–		–		–		–		–		–	
1960	287	(F)	200	(F)N	–		–		–		–		–	
1961	103	(F)	138	(F)	–		–		–		–		–	
1962	300	(A)	80	(A)N	–		–		–		–		–	
1963	500	(A/H)	187	(F)	–		–		–		–		–	
1964	400	(H)	–		–				–		–		–	
1965	100	(A)	–		–		25		–		–		–	
1966	75	(A)	–		–		–		–		–		–	
1967	30	(A)	–		–		–		–		–		–	
1968	15	–	–		–		–		–		–		–	
1969	12	(A)	–		–		–		–		–		–	
1970		–	–		–		–		–		–		–	
1971	305	(A)	–		–		–		–		–		–	
1972		–	–		–		–		–		–		–	
1973	40	(A)	–		–		10		–		–		–	
1974	129	(A)	–		–		35		–		–		–	
1975	260	(F)	–		–		–		–		–		–	
1976	404	(W/F)	–		–		12	N(A)	24		–		13	P(A)
1977	456	(W/F)	–		–		410	E(A)			–			
1978	388	(W/F)	24	E(F)	–		12	N(H)	–		–		63	P(A)
1979	327	(W/F)	16	E(F)	–		–		–		–		10	P(A)
1980	282	(W/F)	68	F(N)	–		–		–		30	P(H)	–	
1981	536	(W/F)	84	E(F)	4	P(F)	28	P(H)	12		84	P(H)	–	
1982	672	(W/F)	138	F(N)	188	N(F)	8	E(A)	–				–	
1983	366	(W/F)	15	F(N)	–		15	P(A)	–		55	N(H)	–	
1984	389	(W/F)	31	F(N)	–		35	N(B)	–		–		–	
1985	320	E(F)	44	E(F)	–		243	N(F)	179		58	N(A)	85	N(A)
1986	708	N(F)	73	F(N)	45	E(A)	240	N(B)	178		104	E(A)	215	E(A)
1987	788	E(H)	71	E(F)	122	N(F)	40	E(A)	51		186	P(A)	175	P(A)
1988	564	N(F)	125	F(N)	167	N(F)	70	P(A)	325		680	N(A)	410	N(A)
1989	530	E(F)	150	A(N)	49	N(H)	80	P(A)	135		193	P(A)	132	P(A)
1990	664	E(F)	83	F(N)	33	P(H)	24	P(A)	–		–		–	
1991	400	N(A)	38	A(N)	46	N(A)	42	N(F)	–		81	P(A)	320	P(A)
1992	778	E(H)	40	E(F)	31	N(A)	48	P(A)	30	P(A)	–		–	
1993	1,060	E(F)	53	E(F)	–		40	N(A)	–		33	P(A)	118	P(A)
1994	572	E(H)	58	E(F)	10	N(A)	87	N(H)	27	P(H)	15	P(H)	–	
1995	343	P(A)	28	A(P)	1	E(A)	38	N(H)	65	N(H)	16	P(A)	43	P(A)
1996	335	N(F)	35	F(N)	21	N(A)	75	N(A)	15	N(H)	78	N(A)	48	P(A)
1997	293	N(F)	–		–		–		55	N(H)	-		30	A(P)
1998	487	E(F)	35	N(A)	28	N(A)	75	N(A)	69	P(A)	-		66	P(A)
1999	605	E(A)	22	N(A)	–		–		550	N(A)	–		5	P(A)
2000	690	N(A)	35	N(A)	–		–		16	P(A)	–		33	N(A)
91–00	556		38		23		58		103		45		83	
2001	1,054	N(F)	28	N(F0			150	N(H)	130	N(A)	248	E(A)	115	E(A)

[a] Andrew Creek total return equals sum of weir count, counts below weir, and on North Fork, minus egg take, 1976–1984.

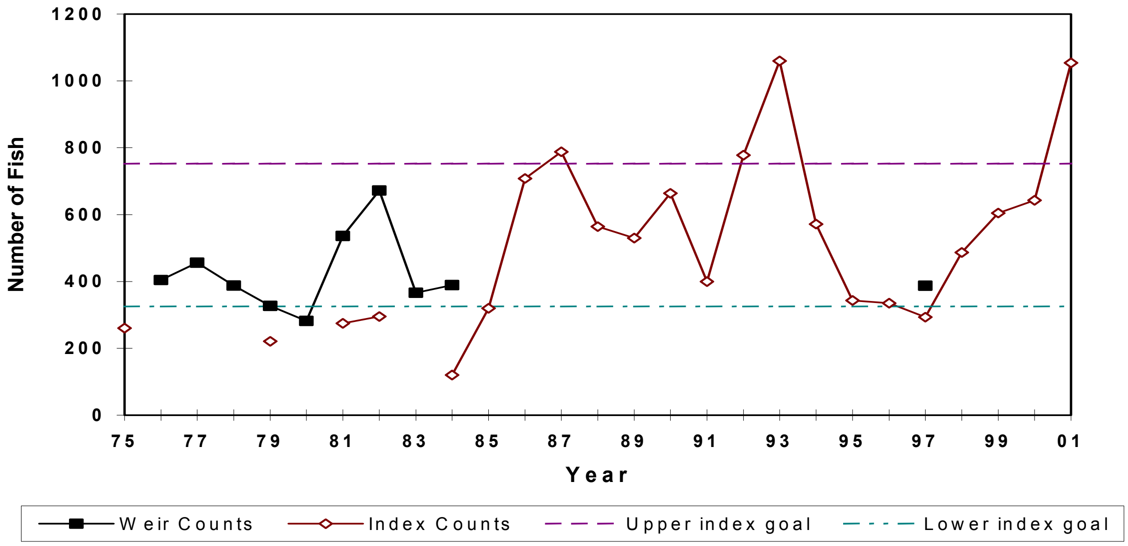

Figure 4.–Counts of chinook salmon at the Andrew Creek Weir, 1976–1984, 1997 and in aerial/foot surveys, 1975, 1985–2001. Lines show upper and lower bounds of index escapement goal range.

One aerial, one helicopter, and one foot survey were conducted over a 10 day period in August, 2001 with 1,130, 659, and 1,054 chinook salmon counted respectively (Appendix A3). The foot count was used as the peak count based on experience from years when the weir was operated and surveys were conducted, and on timing of the surveys.

Age, sex, and length data was collected from 184 pre-spawning fish in Andrew Creek, using angling gear and dip nets (Appendix A4F, A5F).

ALSEK RIVER

The count of large chinook salmon through the Klukshu River weir in 2001 was 1,825 fish, a 34% increase from the count of 1,365 in 2000 (Table 7; Figure 5). The escapement to the Klukshu, estimated by subtracting the Aboriginal Fishery (AF) harvest (87) and sport harvest (0) above the weir from the weir count, was 1,738 fish, within the escapement goal range of 1,100 to 2,300, adopted in 1998 (McPherson et al. 1998b). All of the sport and some of the AF harvest was below the weir.

No aerial survey of the Klukshu River was conducted in 2001. However, in helicopter surveys we counted 287 large chinook salmon in the Takhanne River, 543 in the Blanchard River, 21 in Goat Creek and in a foot survey 7 fish were counted in Low Fog Creek.

There is no agreement in the PSC on use of expansion factors for the Alsek River; expansion factors used in the past have ranged from 1.56 to 2.5, based on assumptions that the Klukshu River represented 40 to 64 percent of the escapement to the entire drainage (Pahlke 1997b). Results from the 1998 tagging study to estimate distribution and escapement of Alsek River chinook salmon indicated that the Klukshu River accounts for about 16–24% of the chinook salmon escapement to the Alsek River drainage (Pahlke et al. 1999). Results from the 1999 and 2000 studies also indicate less than 20% of the escapement to the Alsek drainage is accounted for in the Klukshu River (Pahlke and Etherton 2001a; 2002). On the basis of the results of those two studies, the expansion factor was revised to 5.0. The escapement to the entire drainage was then estimated by expanding the weir count by 5.0 and subtracting the above-weir (87) harvest, resulting in an estimated escapement of 9,038 fish. Results of a mark-recapture experiment indicate a total escapement of 12,885 chinook salmon (SE = 1,438; 11,022 large; Pahlke and Etherton 2002).

Table 7.–Escapement of chinook salmon to the Klukshu River and counts of spawning adults in other tributaries of the Alsek River, 1962–2001. (A) = aerial survey from fixed wing aircraft; (H) = helicopter survey; E = excellent survey conditions; N = normal conditions; P = poor conditions; – = no survey.

	Klukshu River													
Year[a]	Aerial count		Weir count	Above-weir harvest AF	Sport	Brood	Escape-ment [b]	Blanchard River		Takhanne River		Goat Creek		Total [c]
1962	86	A	–	–	–		86	–		–		–		86
1963	–		–	–	–		–	–		–		–		0
1964	20	A	–	–	–		20	–		–		–		20
1965	100		–	–	–		100	100		250		–		450
1966	1,000		–	–	–		1,000	100		200		–		1,300
1967	1,500		–	–	–		1,500	200		275		–		1,975
1968	1,700		–	–	–		1,700	425		225		–		2,350
1969	700		–	–	–		700	250		250		–		1,200
1970	500		–	–	–		500	100		100		–		700
1971	300	A	–	–	–		300	–		–		–		300
1972	1,100		–	–	–		1,100	12	(A)	250		–		1,362
1973	–		–	–	–		–	–		49	(A)	–		49
1974	62		–	–	–		62	52	(A)	132		–		246
1975	58		–	–	–		58	81	(A)	177	(A)	–		316
1976	–		1,278	150	64		1,064	–		–		–		1,064
1977	–		3,144	350	96		2,698	–		–		–		2,698
1978	–		2,976	350	96		2,530	–		–		–		2,530
1979	–		4,404	1,300	0		3,104	–		–		–		3,104
1980	–		2,673	150	0		2,487	–		–		–		2,487
1981	–		2,113	150	0		1,963	35	(H)	11	(H)	–		2,009
1982	633	N(H	2,369	400	0		1,969	59	(H)	241	(H)	13	(H)	2,282
1983	917	N(H	2,537	300	0		2,237	108	(H)	185	(H)	–		2,530
1984	–		1,672	100	0		1,572	304	(H)	158	(H)	28	(H)	2,062
1985	–		1,458	175	0		1,283	232	(H)	184	(H)	–		1,699
1986	738	P(H)	2,709	102	0		2,607	556	(H)	358	(H)	142	(H)	3,663
1987	933	E(H	2,616	125	0		2,491	624	(H)	395	(H)	85	(H)	3,595
1988	–		2,037	43	0		1,994	437	E(H)	169	E(H)	54	E(H)	2,654
1989	893	E(H	2,456	234	0	20	2,202	–		158	E(H)	34	E(H)	2,394
1990	1,381	E(H	1,915	202	0	15	1,698	–		325	E(H)	32	E(H)	2,055
1991	–		2,489	241	0	25	2,223	121	N(H)	86	E(H)	63	E(H)	2,493
1992	261	P(H)	1,367	88	0	36	1,243	86	P(H)	77	N(H)	16	N(H)	1,422
1993	1,058	N(H	3,303	64	0	18	3,221	326	N(H)	351	E(H)	50	N(H)	3,948
1994	1,558	N(H	3,727	99	0	8	3,620	349	N(H)	342	E(H)	67	N(H)	4,378
1995	1,053	E(H	5,678	260	0	21	5,397	338	P(H)	260	P(H)	–		5,995
1996	788	N(H	3,599	215	0	2	3,382	132	N(H)	230	N(H)	12	N(H	3,756
1997	718	P(H)	2,989	160	0	0	2,829	109	P(H)	190	P(H)	–		3,128
1998	–		1,364	17	0	0	1,347	71	P(H)	136	N(H)	39	N(H)	1,593
1999	500	P(H)	2,193	27	0	0	2,166	371	N(H)	194	N(H)	51	N(H)	2,782
2000	–		1,365	44	0	0	1,321	168	N(H)	152	N(H)	33	N(H)	1,698
91–00 avg.	848		2,807	122	0	11	2,675	207		202		41		3,117
2001	–		1,825	87	0	0	1,738	543	N(H)	287	N(H)	21	N(H)	2,589

[a] Escapement counts prior to 1975 may not be comparable due to differences in survey dates and counting methods.

[b] Klukshu River escapement = weir count minus above weir Aboriginal Fishery (AF) catch and broodstock.

[c] Total = Klukshu escapement plus aerial counts of other systems.

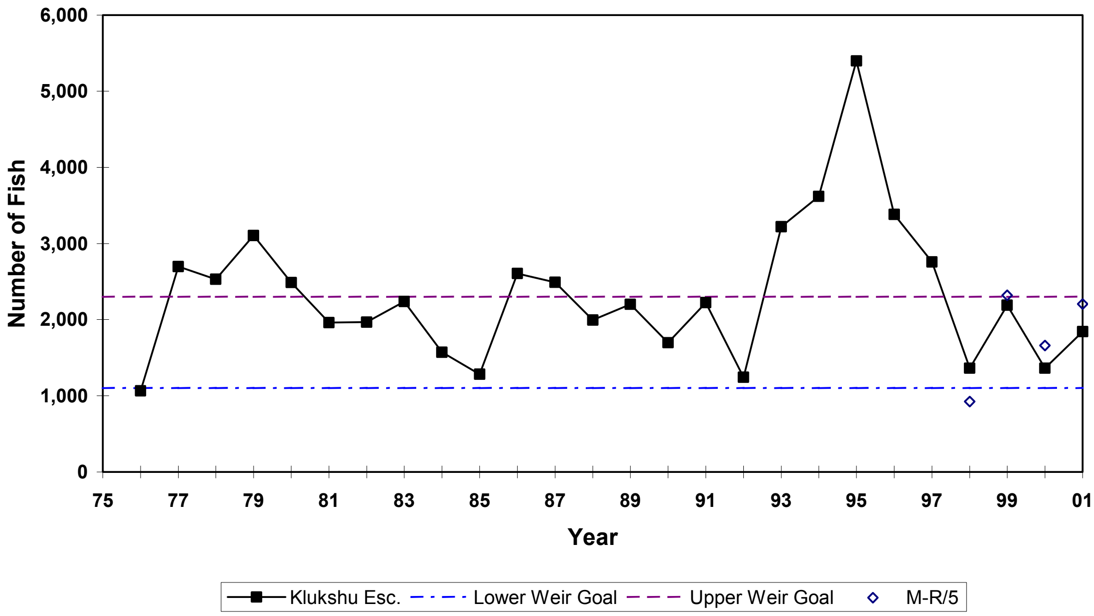

Figure 5. –Weir count of chinook salmon to the Klukshu River tributary of the Alsek River, 1976–2001. Mark-recapture estimates divided by expansion factor of 5.0. Lines show upper and lower limits of revised escapement goal range.

Age, sex and length data were collected from 636 live fish sampled at the Klukshu River weir, other spawning areas and at a lower river tagging project (Appendix A4J; A5J).

UNUK RIVER

In 2001, 2,019 large chinook salmon were counted in all index areas of the Unuk River (Table 8), over twice the recent 10-year average of 874 (Table 9). The total count was above the upper end of the index goal range of 650 to 1,400 (McPherson and Carlile 1997). Index counts have been below the lower end of the escapement goal range only three times since 1981 (Figure 6).

Based on results of mark-recapture and radio-tracking studies, the expansion factors were revised in 1996 from 1.6 to 4.0 times the summed tributary counts on the Unuk and Chickamin rivers (Pahlke et al. 1996, Pahlke 1997a, Pahlke 1997b). After 5 more years of mark-recapture estimates the expansion factors were revised in 2002 to 5.0 on the Unuk and 5.17 on the Chickamin River (McPherson et al. 2003). The expansion factor produced an estimated escapement of 10,095 large chinook salmon to the Unuk River in 2001, an increase of 51% from 2000. The ongoing mark-recapture program estimated an escapement of 11,310 chinook salmon (SE = 1,187; 10,541 large) in 2001 (Weller and McPherson *in prep*). As part of that project, 1,088 fish were sampled for age, sex and size data (Appendix A4D, A5D). Live fish were sampled with angling gear and carcasses were collected by spear.

Table 8.–Peak escapement counts of chinook salmon to index areas of the Unuk River, 1960–2001.

Year[a]	Cripple Creek		Genes Lake Creek		Eulachon Creek		Clear Creek		Lake Creek		Kerr Creek		Total
1960	–[b]		–		250	(A)	–		–		–		250
1961	3	(F)	200	(F)	270	(F)	65	(F)	–		53	(F)	591
1962	–		150	(A)	145	(A)	100	(A)	30	(A)	–		425
1963	100	(A)	750	(A)	150	(A)	25	(A)	–		–		1,025
1964	–		–		25	(A)	–		–		–		25
1965	–		–		–		–		–		–		0
1966	–		–		–		–		–		–		0
1967	–		–		60	(H)	–		–		–		60
1968	–		–		75	(H)	–		–		–		75
1969	–		–		150	(H)	–		–		–		150
1970	–		–		–		–		–		–		0
1971	–		–		30	(A)	–		–		–		30
1972	95	(A)	35	(A)	450	(A)	90	(A)	55	(A)	–		725
1973	–		–		64	(H)	–		–		–		64
1974	–		–		68	(H)	–		–		–		68
1975	–		–		17	(H)	–		–		–		17
1976	–[c]		–		3	(A)	–		–		–		3
1977	529[c]	(F)	339	(F)	57	(H)	34	(H)			15	(H)	974
1978	394[c]	(F)	374	(F)	218	(H)	85	(H)	20	(H)	15	(H)	1,106
1979	363	(F)	101	(F)	48	(H)	14	(H)	30	(H)	20	(H)	576
1980	748	(F)	122	(F)	95	(H)	28	(H)	5	(H)	18	(H)	1,016
1981	324	(F)	112	(F)	196	(H)	54	(H)	20	(H)	25	(H)	731
1982	538	(F)	329	(F)	384	(H)	24	(H)	48	(H)	28	(H)	1,351
1983	459	(F)	338	(F)	288	(H)	24	(H)	12	(H)	4	(H)	1,125
1984	644	(F)	647	(F)	350	(H)	113	(H)	32	(H)	51	(H)	1,837
1985	284	(F)	553	(F)	275	(H)	37	(H)	22	(H)	13	(H)	1,184
1986	532	(F)	838	(F)	486	(H)	183	(F)	25	(H)	62	(H)	2,126
1987	860	(F)	398	(F)	520	(H)	107	(H)	37	(H)	51	(H)	1,973
1988	1,068	(F)	154	(F)	146	(F)	292	(H)	60	(H)	26	(H)	1,746
1989	351	(F)	302	(F)	298	(H)	128	(H)	27	(F)	43	(H)	1,149
1990	86	(F)	284	(F)	81	(H)	103	(F)	26	(F)	11	(H)	591
1991	358	(W/F)	123	(F)	43	(H)	96	(F)	23	(F)	12	(H)	655 [d]
1992	327	(W/F)	360	(F)	57	(F)	69	(F)	31	(H)	30	(H)	874 [d]
1993	448	N(F)	330	N(F)	132	E(F)	137	N(F)	8	N(F)	13	P(H)	1,068
1994	161	P(F)	300	N(F)	52	N(H)	128	E(F)	18	N(F)	52	N(F)	711 [e]
1995	211	N(F)	347	N(F)	74	N(H)	66	E(H)	35	E(H)	39	N(H)	772
1996	417	N(F)	400	N(F)	79	N(F)	148	E(F)	25	E(H)	98	E(F)	1,167
1997	244	P(F)	154	N(F/H)	53	N(F)	113	N(F)	13	N(H)	59	E(F)	636 [f]
1998	311	N(F)	283	N(F)	39	N(H)	81	N(F)	22	N(F)	104	N(F)	840 [g]
1999	202	N(F)	307	N(F)	54	N(H)	67	N(F)	9	N(F)	41	N(F)	680 [h]
2000	450	N(F)	565	N(F)	116	N(H)	86	N(H)	56	E(H)	68	N(H)	1,341 [i]
91–00 Avg	313		317		70		99		24		52		874
2001	701	N(F)	806	N(F/H)	217	E(H)	167	N(H)	84	N(H)	44	P(H)	2,019

[a] Counts prior to 1975 may not be comparable due to differences in survey dates and counting methods.

[b] — = no survey conducted or data not comparable; (F) = escapement survey conducted by walking river; (A) = escapement survey conducted from fixed-wing aircraft; (H) = escapement survey conducted from helicopter; (W/F) = weir and foot count; N = survey conditions normal; E = excellent; P = poor.

[c] Not including 35 fish for egg take in 1976; 132 in 1977; 85 in 1978.

[d] Cripple Cr. weir count reduced by /0.625 to be comparable with foot surveys.

[e] Mark-recapture estimate of escapement 4,623 (SE 1,266; Pahlke et al. 1996).

[f] Mark-recapture estimate of escapement 2,970 (SE 277; Jones III et al. 1998a)

[g] Mark-recapture estimate of escapement 4,132 (SE 413; Jones III and McPherson 1999).

[h] Mark-recapture estimate of escapement 3,914 (SE 490; Jones III and McPherson 2000).

[i] Mark-recapture estimate of escapement 5,872 (SE 644; Jones III and McPherson 2002).

Table 9.–Distribution of spawning chinook salmon among index areas of the Unuk River for years when all index areas were surveyed.

Year	Cripple Creek	%	Genes Lake Creek	%	Eulachon Creek	%	Clear Creek	%	Lake Creek	%	Kerr Creek	%	Total
1978	394	36	374	34	218	20	85	8	20	2	15	1	1,106
1979	363	63	101	18	48	8	14	2	30	5	20	3	576
1980	748	74	122	12	95	9	28	3	5	0	18	2	1,016
1981	324	44	112	15	196	27	54	7	20	3	25	3	731
1982	538	40	329	24	384	28	24	2	48	4	28	2	1,351
1983	459	41	338	30	288	26	24	2	12	1	4	0	1,125
1984	644	35	647	35	350	19	113	6	32	2	51	3	1,837
1985	284	24	553	47	275	23	37	3	22	2	13	1	1,184
1986	532	25	838	39	486	23	183	9	25	1	62	3	2,126
1987	860	44	398	20	520	26	107	5	37	2	51	3	1,973
1988	1,068	61	154	9	146	8	292	17	60	3	26	1	1,746
1989	351	31	302	26	298	26	128	11	27	2	43	4	1,149
1990	86	15	284	48	81	14	103	17	26	4	11	2	591
1991	358	55	123	19	43	7	96	15	23	4	12	2	655
1992	327	37	360	41	57	7	69	8	31	4	30	3	874
1993	448	42	330	31	132	12	137	13	8	0	13	1	1,068
1994	161	23	300	42	52	7	128	18	18	3	52	7	711
1995	211	27	347	45	74	10	66	9	35	5	39	5	772
1996	417	36	400	34	79	7	148	13	25	2	98	8	1,167
1997	244	38	154	24	53	8	113	18	13	2	59	9	636
1998	311	37	283	34	39	5	81	10	22	3	104	12	840
1999	202	30	307	45	54	8	67	10	9	1	41	6	680
2000	450	34	565	42	116	9	86	6	56	4	68	5	1,341
Avg.	425	39	336	31	178	15	95	9	26	3	38	4	1,098
2001	701	35	806	40	217	11	167	8	84	4	44	2	2,019

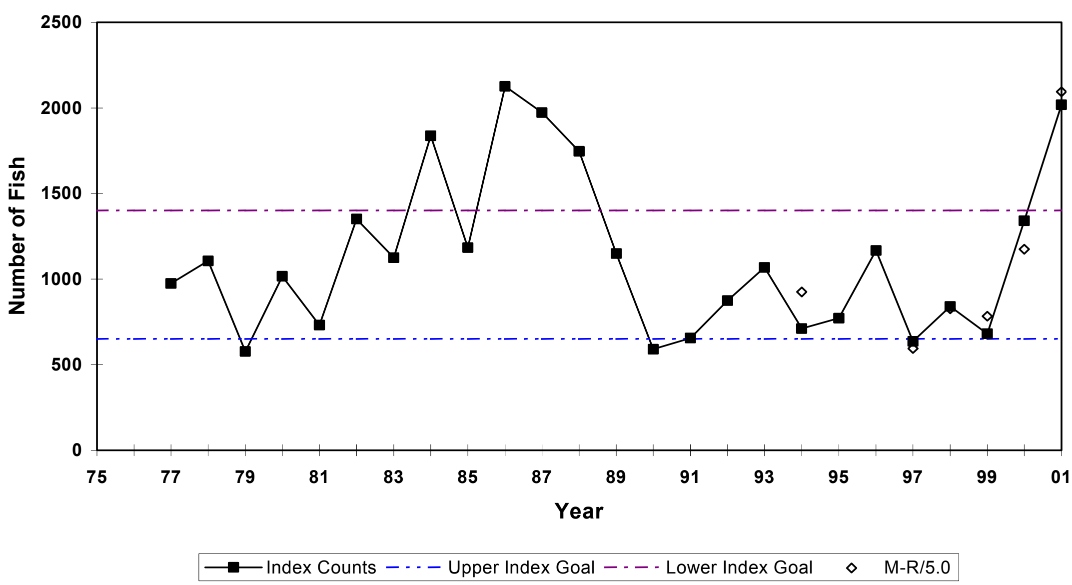

Figure 6.–Counts of large chinook salmon in index areas of the Unuk River, 1975–2001, and mark-recapture estimates divided by expansion factor (5.0). Lines show upper and lower limits of index escapement goal range.

CHICKAMIN RIVER

In index areas on 8 tributaries of the Chickamin River, 1,010 large chinook salmon were counted in 2001, compared to 801 in 2000 (Table 10). Counts in 2001 were above the 10-year average in 7 out of 8 Chickamin River tributaries (Table 11). The 2001 count was above the upper end of the index survey escapement goal range of 450 to 900 fish (Figure 7) (McPherson and Carlile 1997). The summed counts for 2001 were multiplied by a survey expansion factor of 5.17 to produce a total escapement estimate of 5,222 fish to the system. A mark-recapture program conducted in 2001 estimated a total escapement of 6,424 (SE = 1,025) chinook salmon, including 5,177 large chinook salmon (Freeman and McPherson *in prep*).

Angling and spears were used to collect age, sex and length data from 867 fish in 2001 (Appendix A4C, A5C).

BLOSSOM RIVER

In index areas of the Blossom River, 204 large chinook salmon were counted in in 2001, down from 231 fish counted in 2000 (Table 12). The 2001 count was 18% below the lower limit of the index survey goal range of 250 to 500 (McPherson and Carlile 1997). Counts had exceeded the goal from 1982–1989, but since 1991 they have frequently been below the escapement goal range (Figure 8). Based on results of mark-recapture studies, the expansion factors for the Blossom and Keta rivers were revised in 1996 from 1.6 to 2.5 (Pahlke 1997b) and again in 2002 to 4.0 (McPherson et al. 2003). The count for 2001 was multiplied by the expansion factor of 4.0 to produce a total escapement estimate of large 816 fish.

Angling was used to sample age, sex and length data and 18 samples were collected in 2001 (Appendix A4B, A5B).

KETA RIVER

In 2001, 343 chinook salmon were counted in the Keta River, up from 300 counted in 2000 (Table 12) and within the 1996 revised index goal range of 250 to 500 large fish (McPherson and Carlile 1997). Prior to 1990, counts of chinook salmon in the Keta River increased steadily since implementation of the 1980 rebuilding program, and had exceeded the escapement goal range every year since 1981 (Figure 9). Based on results of mark-recapture studies in 1998–2000, the expansion factor for the Keta River was revised in 2001 from 2.5 to 3.0 (Freeman et al. 2001). The peak count for 2001 was multiplied by a survey expansion factor of 3 to produce a total escapement estimate of 1,029 large fish.

Angling was used to collect 193 age, sex and length samples from live fish (Appendix A4A, A5A).

KING SALMON RIVER

Two helicopter surveys and a foot survey were conducted on King Salmon River in 2001. The peak count during the helicopter surveys by the primary observer was 83 large chinook salmon while 98 were counted during the foot survey. This was similar to the 91 fish counted in 2000. (Table 13; Figure 10). The escapement goal was revised in 1997 to a range of 120 to 240 total large fish, (McPherson and Clark *in prep*). The resulting index goal range is 80–160 large fish observed. Counts exceeded the lower bound of the index goal range since 1993 and the 2001 count continued that trend. The peak count of 98 was multiplied by the survey expansion factor of 1.5 to produce a total escapement estimate of 147 large fish to the system. Angling gear was used to collect age, sex and length data from 20 chinook salmon in 2001 (Appendix A4G, A5G).

SITUK RIVER

The count of all chinook salmon through the Situk River weir in 2001 was 1,261 fish. The estimate of sport harvest above the weir is 45 fish. The escapement estimate of large fish (3-5 ocean age) as determined by analysis of length and age samples was 656 (Table 14; McPherson *in prep*). Escapements have exceeded the escapement goal of 600 large spawners (range of 500–1,000) each year since 1984 (Figure 11). The proportion of the recreational harvest that is caught above the weir varies from year to year and is estimated by the local management biologists and from the statewide harvest (Howe et al. 2001). The escapement counts

Table 10.–Counts of chinook salmon in index areas of the Chickamin River, 1960–2001.

Year[a]	South Fork Creek		Barrier Creek		Butler Creek		Leduc Creek		Indian Creek		Humpy Creek		King Creek		Clear Falls Creek		Total[c]
1960	–[b]		–		–		–		–		3	(A)	–		–		3
1961	–		36	(A)	77	(A)	42	(A)	5	(A)	120	(A)	48	(A)	–		328
1962	400	(A)	35	(A)	–		–		–		150	(A)	–		–		585
1963	350	(A)	115	(A)	–		–		–		3	(A)	200	(A)	–		668
1964	–		–		–		–		–		–		–		–		–
1965	–		–		–		–		–		–		75	(A)	–		75
1966	–		–		–		–		–		50	(F)	–		–		50
1967	–		–		–		–		–		-		45	(H)	–		45
1968	–		–		–		–		–		30	(H)	20	(H)	–		50
1969	–		–		–		–		–		10	(H)	45	(H)	–		55
1970	–		–		–		–		–		–		–		–		–
1971	–		–		–		–		–		–		–		–		–
1972	350	(A)	25	(A)	–		85	(A)	–		65	(A)	510	(A)	–		1,035
1973	–		–		–		–		–		14	(A)	65	(A)	–		79
1974	144	(H)	–		–		–		–		–		11	(H)	–		155
1975	141	(H)	9	(H)	66	(H)	6	(H)	90	(H)	7	(H)	30	(H)	–		370
1976	46	(H)	10	(H)	15	(H)	12	(H)	9	(H)	–		–		–		157
1977	52	(H)	66	(H)	30	(H)	26	(H)	53	(H)	0	(H)	–		–		363
1978	21	(H)	94	(H)	4	(H)	42	(H)	20	(H)	–		–		–		308
1979	63	(H)	17	(H)	29	(H)	0	(H)	31	(H)	–		–		–		239
1980	56	(H)	62	(H)	104	(H)	17	(H)	22	(H)	–		–		–		445
1981	51	(H)	105	(H)	51	(H)	25	(H)	12	(H)	4	(F)	105	(F)	31	(H)	384
1982	84	(H)	149	(H)	37	(H)	36	(H)	30	(F)	37	(F)	165	(F)	33	(H)	571
1983	28	(H)	138	(H)	91	(H)	30	(H)	47	(H)	–		212	(F)	30	(H)	599
1984	185	(H)	171	(H)	124	(H)	15	(H)	103	(H)	88	(F)	388	(F)	28	(H)	1,102
1985	163	(H)	129	(H)	92	(H)	8	(H)	125	(H)	50	(H)	377	(H)	12	(H)	956
1986	562	(H)	168	(H)	203	(H)	20	(H)	120	(H)	–		564	(H)	40	(H)	1,745
1987	261	(H)	76	(H)	120	(H)	19	(H)	115	(H)	26	(H)	310	(H)	48	(H)	975
1988	280	(H/F)	82	(H/F)	159	(H)	25	(H/F)	32	(H)	19	(H/F)	164	(H)	25	(H/F)	786
1989	226	(H/F)	90	(H)	137	(H)	57	(H)	84	(H)	22	(H/F)	224	(H)	94	(H)	934
1990	135	(F)	107	(H)	27	(H)	20	(H)	24	(H)	35	(H)	163	(H)	53	(H)	564
1991	125	(H)	18	(H)	49	(H)	14	(H)	38	(H)	13	(H)	185	(H)	45	(H)	487
1992	87	(H)	4	(H)	68	(H)	4	(H)	20	(H)	8	(H)	131	(H)	24	(H)	346
1993	67	N(H)	46	E(H)	68	N(H)	11	N(H)	29	N(H)	13	N(H)	80	N(H)	75	N(H)	389
1994	31	N(H)	29	E(H)	64	E(H)	18	E(H)	16	N(H)	44	N(H)	129	E(H)	57	E(H)	388
1995	87	E(H)	12	E(F)	59	E(F)	60	E(H)	36	N(F)	13	N(F)	62	N(H)	27	E(H)	356[d]
1996	72	N(H)	13	N(F)	74	E(H)	23	E(H)	48	N(F)	30	N(F)	106	E(F)	56	E(H)	422[d]
1997	28	P(H)	10	N(H)	43	N(H)	7	N(H)	24	N(H)	15	N(H)	95	N(H)	50	N(H)	272
1998	46	N(H)	0	N(H)	124	E(H)	16	P(H)	46	N(H)	28	N(H)	123	N(H)	8	P(H)	391
1999	54	N(H)	18	N(H)	106	N(H)	33	N(H)	52	N(F)	16	N(F)	200	N(H)	22	N(H)	501
2000	109	N(H)	27	N(H)	230	E(H)	61	N(H)	63	N(H)	20	N(H)	251	N(H)	40	P(H)	801
91-00 Avg.	71		18		89		25		37		20		136		40		435
2001	264	E(H)	27	N(H)	270	E(H)	59	N(H)	61	N(H)	78	N(F)	221	N(H)	30	N(H)	1,010

[a] Escapement counts conducted prior to 1975 may not be comparable due to differences in survey dates and counting methods.

[b] — = no survey conducted or data not comparable; (A) = escapement surveyed by fixed-wing aircraft; (F) = escapement surveyed by walking stream; (H) = escapement surveyed by helicopter; (H/F) = escapement surveyed by combination of walking and helicopter; N = survey conditions normal; E = excellent.

[c] Totals for 1975–1980, 1983 and 1986 expanded for unsurveyed index areas by 1981–1992 average % observed to those indices.

[d] Mark-recapture estimates of escapement: 1995 = 2,309 large fish (SE 723); 1996 = 1,587 (SE 199).

Table 11.–Distribution of spawning chinook salmon among index areas of the Chickamin River for years when all index areas were surveyed.

Year	South Fork Creek	%	Barrier Creek	%	Butler Creek	%	Leduc Creek	%	Indian Creek	%	Humpy Creek	%	King Creek	%	Clear Falls Creek	%	Total
1981	51	13	105	27	51	13	25	7	12	3	4	1	105	27	31	8	384
1982	84	15	149	26	37	6	36	6	30	5	37	6	165	29	33	6	571
1984	185	17	171	16	124	11	15	1	103	9	88	8	388	35	28	3	1,102
1985	136	14	156	16	93	10	8	0	125	13	50	5	377	39	12	1	957
1987	261	27	76	8	120	12	19	2	115	12	26	3	310	32	48	5	975
1988	280	36	82	10	159	20	25	3	32	4	19	2	164	21	25	3	786
1989	226	24	90	10	137	15	57	6	84	9	22	2	224	24	94	10	934
1990	135	24	107	19	27	5	20	4	24	4	35	6	163	29	53	9	564
1991	125	26	18	4	49	10	14	3	38	8	13	3	185	38	45	9	487
1992	87	25	4	1	68	20	4	1	20	6	8	2	131	38	24	7	346
1993	67	17	46	12	68	17	11	3	29	7	13	3	80	21	75	19	389
1994	31	8	29	7	64	16	18	5	16	4	44	11	129	33	57	15	388
1995	87	24	12	3	59	17	60	17	36	10	13	4	62	17	27	8	356
1996	72	17	13	3	74	18	23	5	48	11	30	7	106	25	56	13	422
1997	28	10	10	4	43	16	7	3	24	9	15	6	95	35	50	18	272
1998	46	12	0	0	124	32	16	4	46	12	28	7	123	31	8	2	391
1999	54	11	18	4	106	21	33	7	52	10	16	3	200	40	22	4	501
2000	109	14	27	3	230	29	61	8	63	8	20	2	251	31	40	5	801
Avg.	1334	201	71	11	96	15	25	4	53	8	27	4	202	31	40	6	649
2001	264	26	27	3	270	27	59	6	61	6	78	8	221	22	30	3	1,010

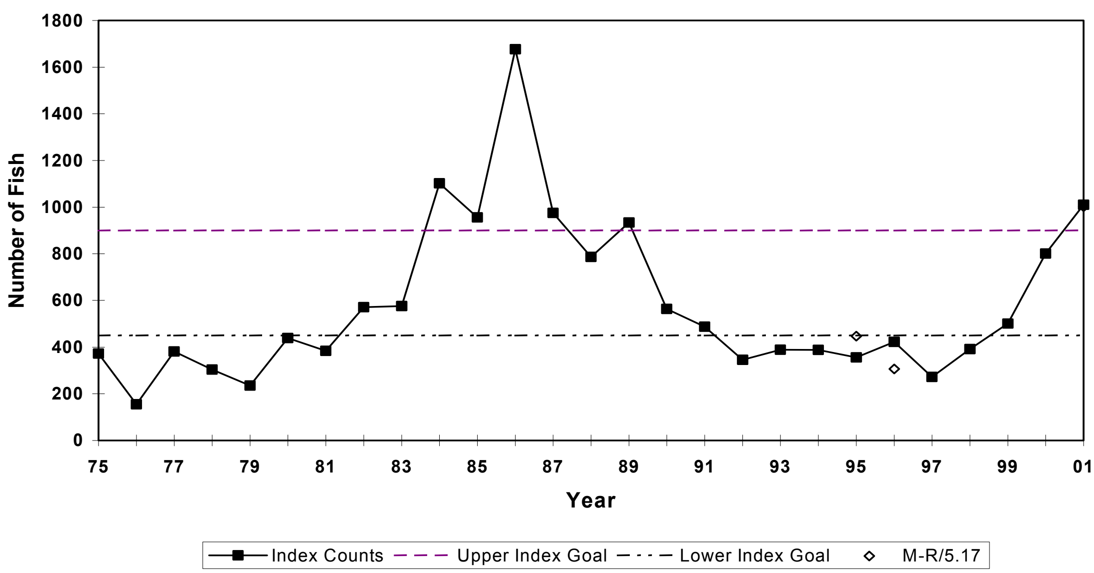

Figure 7.–Counts of chinook salmon in index areas of the Chickamin River, 1975–2001 and mark-recapture estimates divided by expansion factor (5.17). Lines show upper and lower limits of index escapement goal range.

Table 12.–Counts of chinook salmon for selected rivers in Behm Canal, 1961–2001. Survey types: F = foot, A = airplane, H = helicopter, – = no survey. Conditions: P = poor, N = normal, E = excellent.

Year[a]	Keta River		Blossom River		Wilson River		Marten River		Grant River		Klahini River		Total
1961	44	(F)	68	(F)	–		22	(F)	40	(A)	-		174
1962	–		–		–		–		6	(A)	100	(A)	106
1963	–		450	(A)	375	(A)	–		15	(A)	–		840
1964	–		–		–		–		–		–		–
1965	–		–		50	(A)	43	(H)	–		–		93
1966	75	(A)	200	(A)	60	(A)	10	(A)	100	(A)	3	(A)	448
1967	86	(H)	–		8	(H)	7	(H)	15	(H)	–		116
1968	–		–		–		–		4	(H)	–		4
1969	200	(A)	–		10	(A)	10	(A)	69	(H)	3	(H)	292
1970	–		100	(H)	–		–		–		–		100
1971	–				–		–		–		–		–
1972	255	(A)	225	(A)	275	(A)	–		25	(A)	150	(A)	930
1973	–		–		30	(A)	–		38	(A)	7	(H)	75
1974	25	(H)	166	(H)	–		–		–		–		191
1975	203	(H)	146	(H)	7	(H)	15	(H)	–		–		371
1976	84	(H)	68	(H)	–		–		–		–		152
1977	230	(H)	112	(H)	–		–		–		–		342
1978	392	(H)	143	(H)	–		2	(A)	–		–		537
1979	426	(H)	54	(H)	36	(H)	–		–		–		516
1980	192	(H)	89	(H)	–		–		–		–		281
1981	329	(H)	159	(H)	76	(F)	–		25	(H)	42	(F)	631
1982	754	(H)	345	(H)	300	(B)	75	(F)	33	(F)	79	(F)	1,586
1983	822	(H)	589	(H)	178	(B)	138	(B)	8	(A)	10	(H)	1,745
1984	610	(H)	508	(H)	133	(F)	12	(B)	124	(F)	54	(F)	1,441
1985	624	(H)	709	(H)	420	(H)	69	(F)	55	(F)	20	(F)	1,897
1986	690	(H)	1,278	(H)	–		–		–		–		1,968
1987	768	(H)	1,349	(H)	–		270	(H)	33	(A)			2,420
1988	575	(H)	384	(H)	–		543	(H)	–		40	(H)	1,542
1989	1,155	(H)	344	(H)	–		133	(H)	–		–		1,632
1990	606	(H)	257	(H)	–		283	(H)	–		–		1,146
1991	272	N(H)	239	N(H)	–		135	N(H)	–		–		646
1992	217	N(H)	150	N(H)	109	E(H)	76	(H)	25	N(H)	19	(H)	596
1993	362	E(H)	303	N(H)	63	P(H)	229	E(H)	–		–		957
1994	306	E(H)	161	N(H)	–		178	E(H)	–		–		645
1995	175	E(H)	217	N(H)	58	N(H)	171	E(H)	–		–		621
1996	297	N(H)	220	E(H)	23	P(H)	62	N(H)	–		–		602
1997	246	N(H)	132	N(H)	16	N(H)	56	N(H)	9	N(H)	–		459
1998	180	N(H)	91	N(H)	–		–		–		–		271
1999	276	E(H)	212	N(H)	–		–		–		–		488
2000	300	N(H)	231	N(H)	–		–		–		–		531
1991-00 avg.	263		196		54		130		17		19		643
2001	343	E(H)	204	N(H)	79	E(H)	–		–		83	E(H)	626

[a] Escapement counts prior to 1975 may not be comparable due to differences in survey dates or methods.

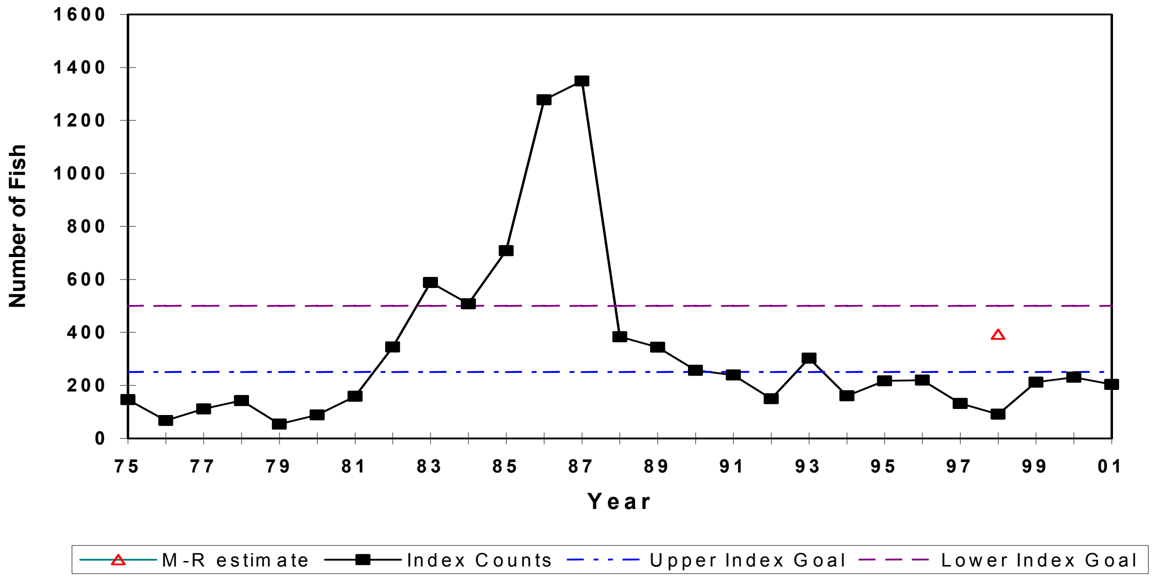

Figure 8.–Counts of chinook salmon into the Blossom River, 1975–2001. Lines show upper and lower limits of index escapement goal range.

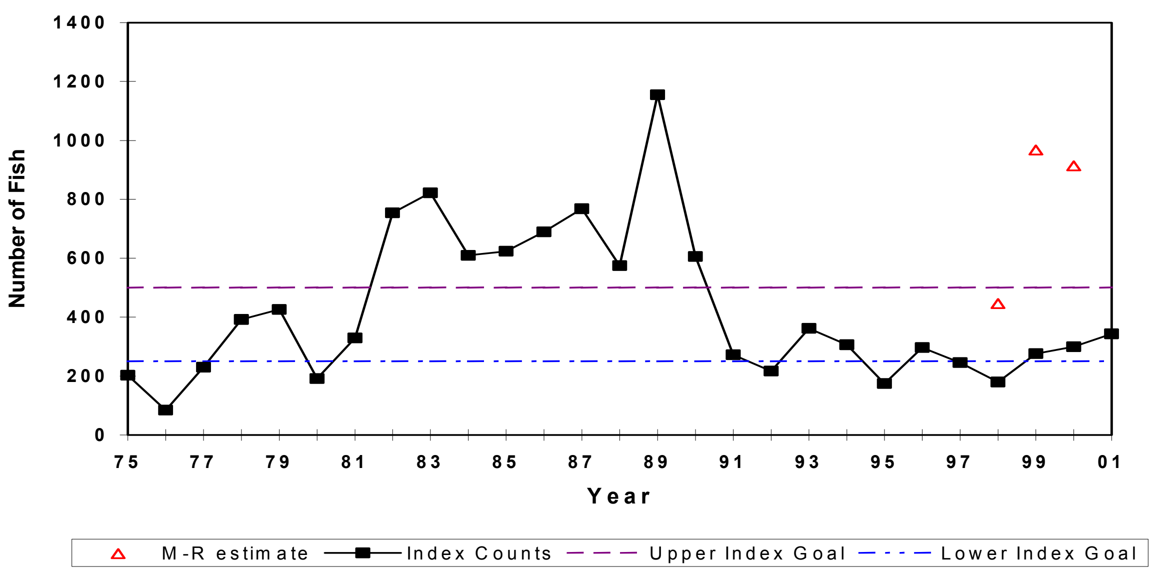

Figure 9.–Counts of chinook salmon to the Keta River, 1975–2001 and mark-recapture estimates for 1998–2000. Lines show upper and lower limits of index escapement goal range.

Table 13.–Peak escapement counts and weir counts of spawning chinook salmon in the King Salmon River, 1957–2001.

	Survey count			Survey as percent of weir count	Total egg take (adults)	Total weir count (adults)	Total weir count (jacks)[b]	Adults below weir (foot ct)	Total inriver (adults)	Total natural spawning
	Below weir	Above weir								
Year	A	B		B/(D-C)	C	D	E	F	D+F	D+F-C
1957	–[a]	200	(F)	–	–	–	–	–	–	
1960	–	20	(F)	–	–	–	–	–	–	
1961	–	117	(F)	–	–	–	–	–	–	
1971	–	94	(F)	–	–	–	–	–	–	
1972	–	90	(F)	–	–	–	–	–	–	
1973	–	211	(F)	–	–	–	–	–	–	
1974	–	104	(F)	–	–	–	–	–	–	
1975	–	42	(H)	–	–	–	–	–	–	
1976	–	65	(H)	–	–	–	–	–	–	
1977	–	134	(H)	–	–	–	–	–	–	
1978	–	57	(H)	–	–	–	–	–	–	
1979	–	88	(H)	–	17	–	–	–	–	
1980	–	70	(H)	–	–	–	–	–	–	
1981	–	101	(H)	–	11	–	–	–	101	90
1982	–	259	(H)	–	30	–	–	–	259	229
1983	25	183	(H)	85%	37	252	20	30	282	245[c]
1984	14	184	(H)	71%	46	299	82	12	311	265[c]
1985	12	105	(H)	64%	29	194	45	10	204	175[c]
1986	9	190	(H)	80%	26	264	72	17	281	255[c]
1987	19	128	(H)	73%	31	207	62	20	227	196[c]
1988	5	94	(H)	50%[d]	35	231	54	12	243	208[c]
1989	34	133	(H)	63%	38[e]	249	71	29	278	240[c]
1990	34	98	(H)	57%	29	190	32	8	198	179[c]
1991	6	91	(H)	72%	20	146	89	8	154	134[c]
1992	–	58	(H)	59%[f]	18	47	16	70	117	99[c]
1993	–	175	E(H)	--------------------------no weir or egg take---------------------						
1994	–	140	N(F)	--------------------------no weir or egg take---------------------						
1995	–	97	P(H)	--------------------------no weir or egg take---------------------						
1996	–	192	E(F)	--------------------------no weir or egg take---------------------						
1997		238	N(F)	--------------------------no weir or egg take---------------------						
1998		88	E(F)	--------------------------no weir or egg take---------------------						
1999		200	E(F)	--------------------------no weir or egg take---------------------						
2000		91	N(F)	--------------------------no weir or egg take---------------------						
1983–92 Avg.	17	126		67%	31	209	56	22	231	188
2001		98	N(F)	--------------------------no weir or egg take---------------------						

[a] — = no survey conducted or data not comparable; (F) = escapement surveyed by walking stream; (H) = escapement surveyed from helicopter; N = survey conditions normal; E = excellent; P = poor.
[b] Minimum count as jacks could pass through weir.
[c] Natural spawning (adults) = (total inriver - egg take; 1983–1992).
[d] Four females and two males were held but not spawned for egg take; % = 94/(231-37-6) = 50%.
[e] Includes holding mortality of 4 males and 6 females for egg take.
[f] Peak survey was after weir was removed 58/99 = 59%.

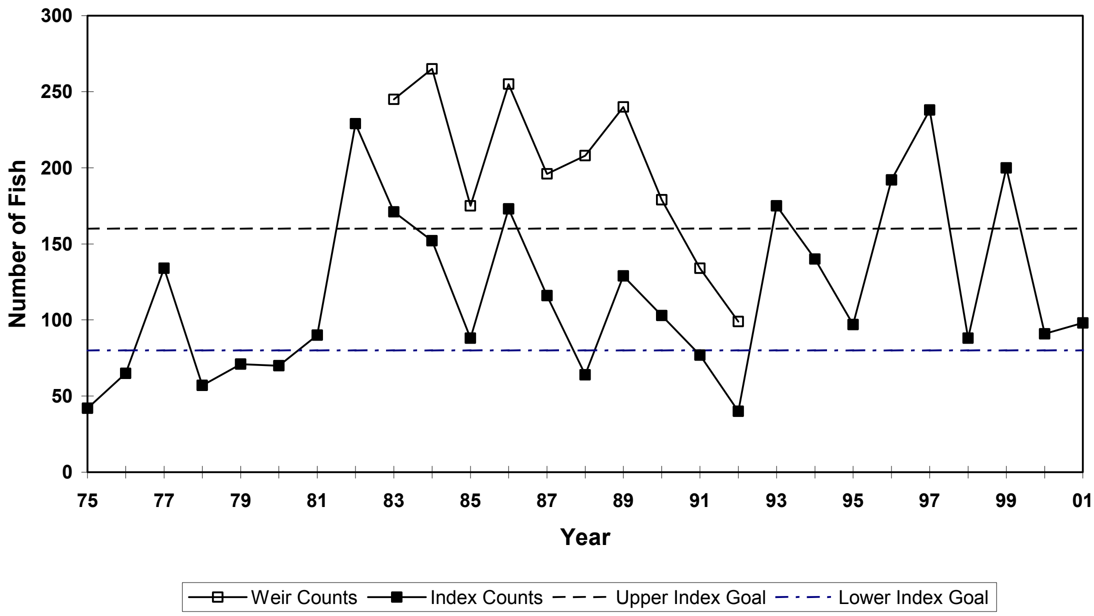

Figure 10.–Counts of chinook salmon at a weir and in survey counts in the index area of the King Salmon River, 1975–2001. Lines show upper and lower limits of index escapement goal range.

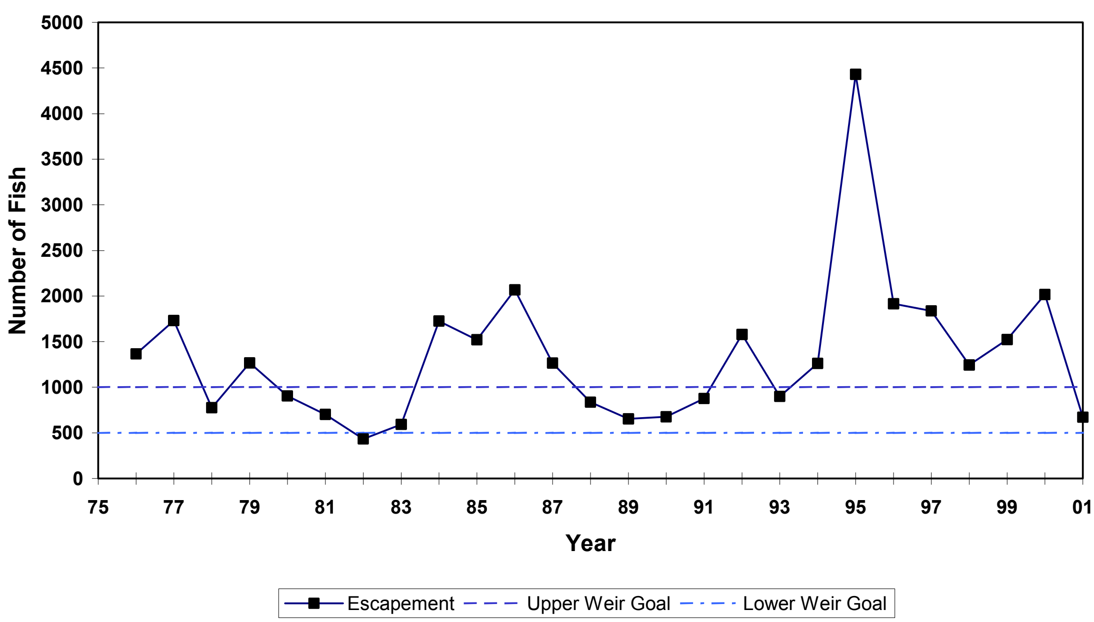

Figure 11.–Counts of large chinook salmon at the Situk River weir, 1975–2001. Lines show upper and lower limits of escapement goal range.

Table 14.–Harvest, escapement, and minimum total run of Situk River chinook salmon, 1976–2001.

	Harvests below weir				Abundance above weir						Estimated total run inriver[a]			
					Total weir count	Harvest above weir	Estimated escapement[d]							
Year	182-70 gillnet	Subsis-tence	Sport	Total			Large	Medium	Small[c]	Total	Large	Medium	Small	Total
1976	1,002	41	200	1,243	1,941	0	1,421	520		1,941				3,184
1977	833	24	244	1,101	1,880	0	1,732	148		1,880				2,981
1978	382	50	210	642	1,103	0	808	295		1,103				1,745
1979	1,028	25	282	1,335	1,800	0	1,284	470		1,800				3,135
1980	969	57	233	1,259	1,125	0	905	220		1,125				2,384
1981	858	62	130	1,050	807	0	702	105		807	1,270	543	44	1,857
1982	248	27	63	338	611	0	434	177		611	672	261	16	949
1983	349	50	52	451	849	0	592	257		849	866	406	28	1,300
1984	512	89	151	752	2,201	0	1,726	475		2,201	2,427	521	5	2,953
1985	484	156	511	1,151	1,982	0	1,521	461		1,982	2,233	683	217	3,133
1986	202	99	37	338	2,572	0	2,067	505		2,572	2,290	583	37	2,910
1987	891	24	395	1,310	1,799	0	1,379	505		1,799	2,215	575	319	3,109
1988	299	90	132	521	1,078	56	868	154		1,022	1,337	259	3	1,599
1989	1	496[b]	0	497	1,871	0	637	243	991	1,871	1,073	198	1,096	2,367
1990	0	516[b]	0	516	1,363	0	628	499	236	1,363	969	755	155	1,879
1991	786	220[b]	67	1,073	1,613	29	889	114	582	1,585	1,678	413	595	2,686
1992	1,504	341	127	1,972	1,985	54	1,595	207	129	1,931	3,103	699	155	3,957
1993	790	202	50	1,042	4,200	202	952	477	2,569	3,998	1,718	753	2,772	5,243
1994	2,656	367	397	3,420	4,416	170	1,271	1,391	1,584	4,246	3,040	3,161	1,764	7,965
1995	8,106	528	1,180	9,814	8,231	506	4,330	565	2,830	7,725	13,439	1,608	3,131	18,177
1996	3,717	478	1,270	5,465	4,151	795	1,800	495	1,061	3,356	6,521	1,509	1,678	9,708
1997	2,339	352	802	3,493	5,001	1,168	1,878	434	1,521	3,834	5,424	1,266	1,923	8,612
1998	2,101	594	494	3,189	5,329	857	924	645	2,902	4,472	3,340	1,924	3,308	8,572
1999	3,810	510	605	4,925	2,786	740	1,461	189	396	2,046	5,453	1,614	644	7,711
2000	1,318	594	352	2,237	3,092	825	1,888	101	278	2,267	4,481	392	455	5,328
91-00	2,713	419	534	3,666	4,080	535	1,725	464	1,357	3,546	4,805	1,297	1,642	7,744
2001	1,087	402	45	1,534	1,261	45	656	97	463	1,216	1,809	481	493	2,783

[a] Total run inriver = chinook escapement + Situk commercial, sport, and subsistence harvests. Commercial and subsistence catches include some small chinook .

[b] Non-retention regulation in effect for commercial fisheries in 1989 and 1990; estimated personal use harvest of 400 large chinook in 1990, 415 in 1990, and 109 in 1991.

[c] Small chinook escapement includes 1- and 2-ocean jacks from 1990 to 1996; 1-ocean fish not counted before 1990.

[d] Escapement from Scott McPherson (*in prep*), based on age composition.

from the base period all exceeded the revised escapement goal, indicating the Situk chinook salmon stock was not depressed and never needed rebuilding.

Age, sex and length data was collected from 103 live fish sampled at the weir (Appendix A4K, A5K).

CHILKAT RIVER

The 2001 escapement to the Chilkat River was estimated by mark-recapture experiment to be 5,272 chinook salmon (SE = 752; 4,517 large), over twice the escapement estimated in 2000 and close to the 10 year average of 4,724 (Ericksen 2002; Appendix A2). The escapement goal was reviewed in 2002 and revised slightly to a range of 1,750 to 3,500 large fish (Ericksen and McPherson *in prep*). The mark-recapture experiment also provided age, sex, and size data from 716 fish captured with nets and spears on the spawning grounds (Appendix A4I, A5I).

OTHER SYSTEMS

Counts of chinook salmon in the Marten and Wilson rivers are not included in the regional index program, and no official escapement goals have been set for these systems. However, periodic counts have been made in the two rivers since 1982 because of their proximity to other surveyed systems. In 2001, 79 chinook were counted on the Wilson River and no chinook salmon survey was conducted on the Marten River.

Grant and Klahini rivers are small chinook systems near the Unuk River in Behm Canal which have been surveyed sporadically. In 2001 83 chinook were counted in the Klahini, while the Grant was not surveyed (Table 12). Since 1995 occasional surveys have been flown on the Harding River and Aaron Creek to determine the feasibility of adding these medium and small systems to the program. In 2001, 150 chinook salmon were counted in the Harding and 130 in Aaron Creek (Table 6). The remaining systems are too remote, and funds are not currently available for these surveys. However, several are routinely surveyed by the local management biologists and in 2001, 248 and 115 chinook were counted in the North and East forks of the Bradfield River, respectively.

OBSERVER TRAINING

An alternate observer accompanied the primary observer on training flights to 25 index areas in 2001 (Table 15). The same alternate observer also conducted two calibration surveys in 2001. The median proportion of the alternates' counts versus the primary observer's counts on the training flights was 97.7% (average 100.2%) and 81.0% on the calibration surveys. This was an improvement over the alternates median count of 80.8% on training flights in 2000 and similar to his median count of 83.5% on calibration flights. Some systems are easier to count chinook salmon in than others. In general the easier systems are the Canadian tributaries of the transboundary rivers where there are no chum salmon and the trees are small. The coastal systems usually have numerous chum salmon and flow through large spruce/hemlock forests. There appears to be a slight trend by the alternate observer to count higher numbers in the systems with chum. This is not surprising, as chums can be difficult to distinguish from chinook salmon.

DISCUSSION

The utility of the index method as a measure of escapement is based on the assumption that the number of fish counted in an index area is a constant proportion of the escapement in the index area or watershed. Therefore, a change in the escapement is assumed to cause a proportional change in the index count. Consequently, if this assumption holds, even though index counts are not estimates of total escapement, multi-year trends in escapement are correct. Two types of error affect the accuracy of the survey counts.

First, factors intrinsic to each area interfere with the ability to count fish. Examples include heavily shaded areas or topography that prevent close approach with a helicopter, presence of other species that could be confused with chinook salmon, and overhanging brush, or deep or occluded water. Also, not all spawning areas in a tributary or drainage are surveyed. These factors are accounted for by survey expansion factors.

Second, factors that affect counting efficiency may vary greatly from year to year and survey to survey. These include annual changes in migratory timing; large changes in abundance that may cause reduced counts relative to the number of fish in the index area; changes in the distribution of spawners among the tributaries of a watershed among years; and inclement weather, turbidity events, or changes in pilot and/or observer experience.

Weather, logistics, run timing, etc., can make it difficult for a single surveyor to complete all the

Table 15.–Observer training and calibration flights conducted in 2001.

Index area	Date	Visibility	Primary observer	Alternate observer	P - A	Percent	Comments
Nahlin IA1	7/29/01	poor	90	90	0	100.0	backseat training flight
Nahlin IA2	7/29/01	normal	173	194	-21	112.1	backseat training flight
Nahlin IA3	7/29/01	excellent	643	630	13	98.0	backseat training flight
Nakina IA1	7/29/01	normal	1,050	577	473	55.0	backseat training flight
Nakina IA2	7/29/01	normal	200	160	40	80.0	backseat training flight
Nakina IA3	7/29/01	poor	290	283	7	97.6	backseat training flight
Dudidontu R.	7/30/01	normal	479	468	11	97.7	backseat training flight
Tatsamenie	8/20/01	normal	1,006	1,030	-24	102.4	frontseat training flight
Kowatua R.	8/20/01	normal	1,030	850	180	82.5	frontseat training flight
Kowatua R.	8/27/01	normal	1,050	750	300	71.4	frontseat training flight
Blanchard	8/1/01	normal	543	381	162	70.2	frontseat training flight
Systems with chinook and sockeye salmon only					Average	87.9	
					Median	97.6	
King Salmon R.	7/26/01	normal	83	52	31	62.7	backseat training flight
Humpy Cr.	8/17/01	normal	5	3	2	60.0	backseat training flight
King Cr.	8/17/01	normal	221	140	81	63.3	backseat training flight
South Fork	8/17/01	excellent	264	269	-5	101.9	backseat training flight
Barrier Cr.	8/17/01	normal	11	13	-2	118.2	backseat training flight
Indian Cr.	8/17/01	normal	15	27	-12	180.0	backseat training flight
Butler Cr.	8/17/01	normal	133	320	-187	240.6	backseat training flight
Clear Falls	8/17/01	normal	14	20	-6	142.9	backseat training flight
Leduc Cr.	8/17/01	normal	36	34	2	94.4	backseat training flight
Keta River	8/17/01	excellent	343	448	-105	130.6	backseat training flight
Eulachon R.	8/17/01	normal	178	230	-52	129.2	backseat training flight
Clear Creek	8/17/01	poor	48	8	40	16.7	backseat training flight
Lake Creek	8/17/01	normal	67	62	5	92.5	backseat training flight
Kerr Creek	8/17/01	poor	43	45	-2	104.7	backseat training flight
Systems with chinook, chum and pink salmon					Average	109.8	
					Median	103.3	
Totals					Average	100.2	
					Median	97.7	
L. Tahltan	7/30/01	normal	4,158	3,730	428	89.7	calibration survey
Tatsamenie	8/27/01	normal	1,024	740	284	72.3	calibration survey
					Average	81.0	

[a] P: primary observer, KAP, A: alternate, JAD.

[b] FSTF = alternate observer sits in front (preferred) seat; BSTF = alternate observer sits in back seat.

index surveys annually under good or excellent conditions. Thus, alternate surveyors are selected to conduct the counts when the primary surveyor can not. Also, new surveyors take on primary responsibilities at infrequent intervals. Since between observer variability and bias can be significant (Jones III et al. 1998b), new surveyors must be trained and calibrated against the primary surveyor to provide consistency and continuity in the data.

Estimates of total escapement (direct estimates or expanded counts) are needed when comparing escapements among watersheds or for estimating exploitation rates and spawner/recruit relationships. Though survey and tributary expansion factors have been endorsed by the Pacific Salmon Commission (PSC) since 1981, the original expansion factors were developed on the basis of judgment rather than on empirical data (Appendix B *in* Pahlke 1997b), and error associated with these expansions can be large. Johnson et al. (1992) showed that expansion factors for the Chilkat River, for example, greatly underestimated escapement to that watershed. ADF&G recognized the need to develop better expansions throughout the region, and has independently estimated distribution and escapement for chinook salmon in the Unuk (Pahlke et al. 1996; Jones III and McPherson 1999; 2000), Chickamin (Pahlke 1996; 1997a), Stikine (Pahlke and Etherton 1999; Bernard et al. 2000), Taku (Pahlke and Bernard 1996,McPherson et al. 1998a, 2000), Keta (Brownlee et al. 1999) and Alsek rivers (Pahlke et al. 1999). Total escapement projects are continuing on many of those rivers.

On the basis of information collected on the Unuk and Chickamin rivers, expansion factors for the four Behm Canal systems were revised in 1996. After three mark-recapture experiments the expansion factor for the Keta River was revised again in 2001. The expansion factor for the King Salmon River was based on 10 years of weir counts compared with aerial surveys, and the expansion factor for Andrew Creek was based on 4 years of paired weir and survey counts. The expansion factor for the Taku River was revised in 1999 after 5 years of mark-recapture data (McPherson et al. 2000). The expansion factor for the Alsek River was revised in 2000 based on 2 years of mark-recapture studies.

Changing the escapement goals, however, requires a formal review by ADF&G and the Chinook Technical Committee of the PSC, as was done for the Situk River in 1991, the Behm Canal systems in 1994, and King Salmon River in 1997. The Andrew Creek escapement goal was also revised in 1998 to a range of 650 to 1,500 total large spawners (Clark et al. 1998). The Canadian Department of Fisheries and Oceans and the Transboundary Technical Committee are included in any review of Taku, Stikine or Alsek River goals. In 1998, a revised stock-recruitment analysis by ADF&G and DFO staff estimated that the escapement goal for the Klukshu River should range between 1,100 and 2,300 spawners (McPherson et al. 1998b). Escapement goals for the Taku and Stikine rivers were approved in 1999 (McPherson et al. 2000; Bernard et al. 2000).

Expansion factors and escapement goals will continue to be revised as we complete more studies which include both index counts and estimates of total escapement. Any change in survey methods or observers must take into account the comparability of historical data with new data. Year-to-year consistency and repeatability of index counts may be more important than their absolute accuracy to agencies that compare escapement estimates between years.

Currently, only one of the 22 minor producers in the region and six of nine medium (seven with Chilkat) producing watersheds are included in the index survey program. Prior to 1997, counts from these streams were expanded to represent the escapement of all streams in minor and medium producing categories. The King Salmon River is unique among Southeast Alaska chinook populations as the only island system, and using it to represent the other 21 small systems most likely produced inaccurate estimates of total escapement. However, because escapement to small and medium systems are a small proportion of the total region escapement, errors in those estimates would have little effect on estimates of regional escapement. In 1997, the method used to expand the index counts to a total region escapement estimate was revised based on over 20 years of systematic escapement surveys in Southeast Alaska and the transboundary rivers. The revised method assumes the sum of the expanded indices accounts for approximately 90% of the total escapement and that number is expanded to account for the remaining 10%. We think this method more accurately reflects the geographic distribution of the unsurveyed systems.

Observer training and calibration flights conducted in 2000 and 2001 indicated a fairly consistent undercounting by the alternate observer when compared with the primary observer counts.

These flights will be continued in the future and reanalyzed as more calibration surveys are completed.

Escapement goal revisions based on spawner-recruit analysis require a long time series of age and sex composition data along with total escapement estimates. Age, sex, and length composition estimates for all sampled chinook stocks in Southeast Alaska and transboundary rivers are presented in Appendix tables A4-A5. An interesting trend became apparent in 1999, with the largest fish occurring in the southern systems and average size decreasing towards the north. In 2000 and 2001, the largest fish were again seen in the southern systems, but the fish in two of the northern systems: Chilkat and Alsek rivers were larger than chinook salmon in the central systems. Many (up to 75%) of the 2-ocean fish sampled on the Blossom, Keta and Chickamin rivers were of legal size (28" total length; approximately 625mm MEF), which is uncommon in other systems. When mean lengths at age were tested for differences, lengths from the Keta, Blossom and Chickamin rivers were not different from each other but were statistically larger than those of other systems in almost every case (Appendix A6).

The age-.2 (2-ocean-age jack) component was relatively low which indicates low survival rates for the 1997 brood year. The 3-ocean-age (1996 brood) class was dominant in all systems in 2001, while age-.4 fish comprised a similar percentage in most systems, compared to 2000.

Sampling strategies were designed to make he estimated age and sex distributions relatively unbiased for age-.2 to age-.5 fish. A weir was used to sample the Situk River; stratified mark-recapture studies were used on the Alsek, Chilkat, Taku, Stikine, Unuk and Chickamin rivers; and non-selective rod and reel and/or carcass sampling was used on the Blossom, Keta, Andrew Creek and King Salmon systems. Therefore, comparisons of length or age compositions between stocks within the age-.2. to age-.5 should be relatively unbiased for stocks with adequate sample sizes. The Situk River is the only chinook system in Southeast Alaska where the escapement of age-.1 jacks are estimated annually. The mean length at age data is unbiased for all stocks.

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APPENDIX A

Appendix A1.–Survey escapement goals and system goals for large chinook salmon, Southeast Alaska and transboundary rivers, as accepted by ADF&G, DFO, CTC and TTC, 2001.

		Index survey goal[a]			System goal[b]		
			Range			Range	
River	**Index areas**	**Point est.**	**Lower**	**Upper**	**Point est.**	**Lower**	**Upper**
Alsek[c]	Klukshu		1,100	2,300			
Taku[d]	5 tributaries	7,000	5,800	10,600	36,000	30,000	55,000
Stikine[e]	Little Tahltan	3,300	2,700	5,300	17,500	14,000	28,000
Situk[f]	All				600	550	1,000
Chilkat	All				2,200	1,750	3,500
Andrew Cr.[g]	All	425	325	750	850	650	1,500
Unuk[h]	6 tributaries	800	650	1,400			
Chickamin[h]	8 tributaries	525	450	900			
Blossom[h]	All	300	250	500			
Keta[h]	All	300	250	500			
King Salmon R.[i]	All	100	80	160	150	120	240

[a] Index survey goal corresponds to the peak or highest single day count of large spawners in annual survey counts.

[b] System goal corresponds to the estimated total escapement of large spawners in the river system, estimated from mark-recapture studies, weir counts or expanded survey counts.

[c] McPherson et al. 1998b.

[d] McPherson et al. 2000.

[e] Bernard et al. 2000.

[f] McPherson 1991.

[g] Clark et al. 1998.

[h] McPherson and Carlile, 1997.

[i] McPherson and Clark, *in prep*.

Appendix A2.–Estimated total escapements of large chinook salmon to escapement indicator systems and to Southeast Alaska and transboundary rivers, 1975–2001. Numbers may be revised annually as data are collected. Index escapements are expanded for survey counting rates and unsurveyed tributaries, numbers in **bold type** are weir counts or mark-recapture estimates and are not expanded [region total expanded for 84% w/o Chilkat River, 90% with Chilkat escapement included].

	MAJOR SYSTEMS				MEDIUM SYSTEMS										
Year	Alsek	Taku	Stikine	Major subt.	Situk	Chilkat	Andrew	Unuk	Chick-amin	Blos-som	Keta	Med subt.	King Salmon	Total all systems	Expanded region total
1975		12,920	7,571				520		1,914	584	609		62		
1976	5,320	24,582	5,723	35,625	**1,421**		**404**		810	272	252		96		
1977	13,490	29,496	11,445	54,431	**1,732**		**456**	4,870	1,875	448	690	10,071	199	64,701	77,025
1978	12,650	17,124	6,835	36,609	**808**		**388**	5,530	1,594	572	1,176	10,068	84	46,761	55,668
1979	15,520	21,617	12,610	49,747	**1,284**		**327**	2,880	1,233	216	1,278	7,218	113	57,078	67,950
77-79 Avg.	13,887	22,746	10,297	46,929	1,275		390	4,427	1,567	412	1,048	9,119	132	56,180	66,881
1980	12,435	39,239	30,573	82,247	**905**		**282**	5,080	2,299	356	576	9,498	104	91,849	109,344
1981	9,815	49,559	36,057	95,431	**702**		**536**	3,655	1,985	636	987	8,501	139	104,071	123,894
1982	9,845	23,847	40,488	74,180	**434**		**672**	6,755	2,952	1,380	2,262	14,455	**354**	88,989	105,939
1983	11,185	9,795	6,424	27,404	**592**		**366**	5,625	3,099	2,356	2,466	14,504	**245**	42,153	50,182
1984	7,860	20,778	13,995	42,633	**1,726**		**389**	9,185	5,697	2,032	1,830	20,859	**265**	63,757	75,901
1985	6,415	35,916	16,037	58,368	**1,521**		640	5,920	4,943	2,836	1,872	17,732	**175**	76,275	90,804
1986	13,035	38,110	14,889	66,034	**2,067**		1,414	10,630	9,022	5,112	2,070	30,315	**255**	96,604	115,004
1987	12,455	28,935	24,632	66,022	**1,379**		1,576	9,865	5,041	5,396	2,304	25,561	**196**	91,779	109,261
1988	9,970	44,524	37,554	92,048	**868**		1,128	8,730	4,064	1,536	1,725	18,051	**208**	110,307	131,318
1989	11,010	**40,329**	24,282	75,621	**637**		1,060	5,745	4,829	1,376	3,465	17,112	**240**	92,973	110,682
Avg.	10,403	33,103	24,493	67,999	1,083		806	7,119	4,393	2,302	1,956	17,659	218	85,876	102,233
1990	8,490	**52,142**	22,619	83,251	**628**		1,328	2,955	2,916	1,028	1,818	10,673	**179**	94,103	112,027
1991	11,115	51,645	23,206	85,966	**889**	**5,897**	800	3,275	2,518	956	816	15,151	**134**	101,251	112,501
1992	6,215	55,889	34,129	96,233	**1,595**	**5,284**	1,556	4,370	1,789	600	651	15,845	**99**	112,177	124,641
1993	16,105	66,125	58,962	141,192	**952**	**4,472**	2,120	5,340	2,011	1,212	1,086	17,193	259	158,644	176,271
1994	18,100	48,368	33,094	99,562	**1,271**	**6,795**	1,144	**4,623**	2,006	644	918	17,401	207	117,170	130,189
1995	26,985	**33,805**	16,784	77,574	**4,330**	**3,790**	686	3,860	**2,309**	868	525	16,368	144	94,086	104,540
1996	17,995	**79,019**	**28,949**	125,963	**1,800**	**4,920**	670	5,835	**1,587**	880	891	16,583	288	142,834	158,704
1997	**15,250**	**114,938**	**26,996**	157,184	**1,878**	**8,100**	586	**2,970**	1,406	528	738	16,206	357	173,747	193,052
1998	**4,621**	31,039	**25,968**	61,628	**924**	**3,675**	974	**4,132**	2,021	**364**	**446**	12,536	132	74,296	82,551
1999	**11,597**	**20,545**	**19,947**	52,089	**1,461**	**2,271**	1,210	**3,914**	2,544	848	**968**	13,216	300	65,605	72,894
Avg.	13,647	55,352	29,065	98,064	1,573	5,023	1,107	4,127	2,111	793	886	15,117	210	113,391	126,737
2000	**8,295**	30,014	**27,531**	65,840	**1,785**	**2,035**	1,380	**5,872**	4,141	924	**913**	17,050	137	83,027	92,252
2001	**11,022**	**41,179**	**63,523**	115,724	**656**	**4,517**	2,108	**10,541**	**5,177**	816	1,029	24,844	147	140,715	156,350
CHANGE FROM 2000 to 2001:															
Number	2,727	11,165	35,992	49,884	(1,129)	2,482	728	4,669	1,036	(108)	116	7,794	10	57,688	64,098
Percent	33%	37%	131%	76%	-63%	122%	53%	80%	25%	-12%	13%	46%	7%	69%	69%
Escapement goals:															
Lower	5,500	30,000	14,000	49,400	500	1,750	650	3,250	2,325	1,000	750	10,225	120	60,845	67,606
Point	8,500	36,000	17,500	62,000	600	2,200	800	4,000	2,700	1,200	900	12,400	150	74,550	82,833
Upper	11,500	55,000	28,000	92,200	1000	3,500	1,500	7,000	4,650	2,000	1,500	21,150	240	113,890	126,544
Average percent of goal:															
77-79	163%	63%	59%	76%	212%		49%	111%	58%	34%	116%	74%	88%	75%	
80-89	122%	92%	140%	110%	181%		101%	178%	163%	192%	217%	142%	145%	115%	
90-98	161%	154%	166%	158%	262%	228%	138%	103%	78%	66%	98%	122%	140%	152%	

Appendix A3.–Detailed 2001 Southeast Alaska chinook salmon escapement surveys as entered into Commercial Fisheries Division Integrated Fisheries Database (IFDB/ALEX). Includes all surveys where chinook salmon were observed, many are not used to estimate escapement.

Stream no.	Stream	Date	Tidal	Mouth	Live	Dead	Total	Survey	Obs[a]	Use[b]	Comment
10130030	Keta River	7/2/01	0	0	20	0	20	A	PSD	3	
10130030	Keta River	8/12/01	0	0	301	0	301	H	KAP	3	98 below Hill Cr
10130030	Keta River	8/17/01	0	0	340	0	340	H	KAP	3	100 below tent camp
10130030	Keta River	8/17/01	0	0	448	0	448	H	JAD	2	
10145007	Herring Cove	7/24/01	600	1000	0	0	1600	A	SBW	3	
10155020	Wilson River	8/12/01	0	0	79	0	79	H	KAP	3	
10155040	Blossom River	8/12/01	0	0	149	0	149	H	KAP	3	
10155040	Blossom River	8/17/01	0	0	204	0	204	H	KAP	3	only 5 above 3rd jam
10155040	Blossom River	8/17/01	0	0	209	0	209	H	JAD	2	
1017104A	Barrier Creek	8/7/01	0	0	27	0	27	H	KAP	3	
1017104A	Barrier Creek	8/17/01	0	0	11	0	11	H	KAP	3	
1017104A	Barrier Creek	8/17/01	0	0	13	0	13	H	JAD	2	
1017104B	Butler Creek	8/7/01	0	0	270	0	270	H	KAP	3	
1017104B	Butler Creek	8/8/01	0	0	301	0	301	F	KAP	3	
1017104B	Butler Creek	8/17/01	0	0	130	0	130	H	KAP	3	
1017104B	Butler Creek	8/17/01	0	0	320	0	320	H	JAD	2	
1017104C	Clear Creek	8/7/01	0	0	30	0	30	H	KAP	3	
1017104C	Clear Creek	8/11/01	0	0	25	0	25	H	KAP	3	
1017104C	Clear Creek	8/17/01	0	0	13	1	14	H	KAP	2	Late
1017104C	Clear Creek	8/17/01	0	0	20	0	20	H	JAD	2	
1017104E	Choca Creek	8/11/01	0	0	11	0	11	H	KAP	2	
1017104H	Humpy Creek	8/2/01	0	0	3	0	3	H	JAD	2	
1017104H	Humpy Creek	8/17/01	0	0	5	0	5	H	KAP	1	too many humpies for good survey
1017104H	Humpy Creek	8/29/01	0	0	75	0	75	F	DLM	3	
1017104I	Indian Creek	8/7/01	0	0	61	0	61	H	KAP	3	
1017104I	Indian Creek	8/12/01	0	0	66	0	66	F	KAP	3	Shane Rear survey
1017104I	Indian Creek	8/17/01	0	0	15	0	15	H	KAP	2	partial, late
1017104I	Indian Creek	8/17/01	0	0	27	0	27	H	JAD	2	
1017104J	Lucky Jake Creek	8/7/01	0	0	39	0	39	H	KAP	2	
1017104K	King Creek	8/11/01	0	0	108	0	108	H	KAP	2	poor cond, too many humpies
1017104K	King Creek	8/17/01	0	0	216	5	221	H	KAP	3	
1017104K	King Creek	8/17/01	0	0	140	0	140	H	JAD	2	
1017104L	Leduc River	8/7/01	0	0	59	0	59	H	KAP	3	
1017104L	Leduc River	8/11/01	0	0	30	0	30	H	KAP	2	

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Stream no.	Stream	Date	Tidal	Mouth	Live	Dead	Total	Survey	Obs[a]	Use[b]	Comment
1017104L	Leduc River	8/17/01	0	0	36	0	36	H	KAP	3	
1017104L	Leduc River	8/17/01	0	0	34	0	34	H	JAD	2	
1017104P	Ranger Paige Creek	8/7/01	0	0	6	0	6	H	KAP	2	
1017104S	South Fork Chickamin	8/7/01	0	0	181	0	181	H	KAP	2	
1017104S	South Fork Chickamin	8/17/01	0	0	264	0	264	H	KAP	3	
1017104S	South Fork Chickamin	8/17/01	0	0	269	0	269	H	JAD	2	
10175015	Eulachon River	8/11/01	0	0	217	0	217	H	KAP	3	120 below fork, 17 left fork
10175015	Eulachon River	8/17/01	0	0	178	0	178	H	KAP	3	111 below fork, 16 left fork
10175015	Eulachon River	8/17/01	0	0	230	0	230	H	JAD	2	
10175015	Eulachon River	8/18/01	0	0	168	50	218	F	NLZ	3	up to first falls
1017503B	Boundary Cr Unik R	8/10/01	0	0	143	0	143	F	KAP	3	
10175050	Klahini River	8/11/01	0	0	83	0	83	H	KAP	3	
1017530C	Clear Creek-Unuk R	8/7/01	0	0	167	0	167	H	KAP	3	
1017530C	Clear Creek-Unuk R	8/11/01	0	0	132	0	132	H	KAP	3	
1017530C	Clear Creek-Unuk R	8/17/01	0	0	38	10	48	H	KAP	2	poor conditions
1017530C	Clear Creek-Unuk R	8/17/01	0	0	8	0	8	H	JAD	2	
1017530G	Genes Lake CreekUnuk	8/7/01	0	60	0	0	60	H	KAP	3	too many socks and pinks for good count
1017530G	Genes Lake CreekUnuk	8/11/01	0	440	0	0	440	H	KAP	3	lots sockeye
1017530G	Genes Lake CreekUnuk	8/12/01	0	440	348	18	806	H	KAP	3	peak total, foot & helo combined
1017530G	Genes Lake CreekUnuk	8/12/01	0	0	348	18	366	F	NLZ	3	foot survey creek
1017530G	Genes Lake CreekUnuk	8/17/01	0	350	0	0	350	H	KAP	2	in lake
1017530K	Kerr Creek-Unuk R	7/30/01	0	0	31	0	31	F	KAP	2	Shane Rear survey
1017530K	Kerr Creek-Unuk R	8/7/01	0	0	44	0	44	H	KAP	3	murky
1017530K	Kerr Creek-Unuk R	8/17/01	0	0	43	0	43	H	KAP	3	murky
1017530K	Kerr Creek-Unuk R	8/17/01	0	0	45	0	45	H	JAD	2	
1017530L	Lake Creek-Unuk R	8/7/01	0	0	84	0	84	H	KAP	3	57 at riffles
1017530L	Lake Creek-Unuk R	8/11/01	0	0	74	0	74	H	KAP	3	45 at riffle
1017530L	Lake Creek-Unuk R	8/17/01	0	0	67	0	67	H	KAP	3	half at riffle
1017530L	Lake Creek-Unuk R	8/17/01	0	0	62	0	62	H	JAD	2	
1017530Q	Cripple Ck-Unuk R	7/25/01	0	0	52	0	52	F	KAP	2	Early, shane survey
1017530Q	Cripple Ck-Unuk R	8/8/01	0	0	666	35	701	F	KAP	3	59 jacks
10180070	Hatchery Ck-Yes Bay	8/23/01	0	0	54	0	54	F	SCH	2	
10180070	Hatchery Ck-Yes Bay	8/29/01	0	0	90	2	92	F	TPZ	2	most paired up and spawning
10180070	Hatchery Ck-Yes Bay	9/10/01	0	0	3	20	23	F	SCH	2	
10644031	Crystal Creek	6/28/01	300	0	0	0	300	A	WRB	2	250 BLW, 50 ABV RAPIDS

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Stream no.	Stream	Date	Tidal	Mouth	Live	Dead	Total	Survey	Obs[a]	Use[b]	Comment
10644031	Crystal Creek	7/3/01	600	1100	0	0	1700	A	WRB	2	250 BLW RAPIDS 300 ABV, 50 FLOATING ROCKS
10644031	Crystal Creek	7/8/01	11	11	0	0	22	A	WRB	1	FLOODING
10740024	Aaron Creek	7/23/01	0	0	0	0	0	A	WRB	1	FOGGY WHERE KINGS LAY
10740024	Aaron Creek	8/3/01	0	0	130	0	130	A	WRB	2	70K ABV GLACIER WATER FORK
10740024	Aaron Creek	8/11/01	0	0	63	0	63	A	WRB	2	INC 36 NEAR FKS @ FISH BLOCK
10740038	Marten Ck Bradfield	8/11/01	0	0	13	0	13	F	RSH	2	
10740049	Harding River	7/17/01	0	0	18	0	18	A	WRB	2	too many chums for good king count
10740049	Harding River	7/23/01	0	0	25	0	25	A	WRB	2	
10740049	Harding River	8/11/01	0	0	150	0	150	H	KAP	3	
10740052	Bradfield River N Fk	8/11/01	0	0	248	0	248	A	WRB	2	BEST VIS EVER, PARTIALLY GLACIAL
10740053	Bradfield River E Fk	8/11/01	0	0	115	0	115	A	WRB	2	VIS AS GOOD AS IT GETS
10840016	Kikahe River	8/15/01	0	0	43	1	44	F	TST	2	
10840017	Goat Ck Stikine R	8/2/01	0	50	46	0	96	F	TWR	2	1 TAGGED KING, 1 JACK
10840020	Andrews Creek	7/23/01	0	0	75	0	75	A	WRB	2	ALL IN LOWER MILE
10840020	Andrews Creek	8/6/01	0	0	659	0	659	H	KAP	3	194 in N. Fork
10840020	Andrews Creek	8/10/01	0	360	770	0	1130	A	WRB	2	INC 110 IN E FORK
10840020	Andrews Creek	8/15/01	0	0	557	104	661	F	WRB	2	PAST PEAK ONLY S FK, 2 TAG #K06006
10840020	Andrews Creek	8/16/01	0	125	794	135	1054	F	WRB	2	COMBINED SURVEY, BOTH FKS, PAST PEAK
10840020	Andrews Creek	8/16/01	0	125	237	31	393	F	TWR	2	1 TAG #K06871, E. FK ONLY
10841010	North Arm Creek	7/23/01	0	0	26	0	26	A	WRB	2	
10841010	North Arm Creek	8/2/01	0	0	28	0	28	F	TWR	2	INCLUDES 2 JACKS
10841010	North Arm Creek	8/10/01	0	0	23	0	23	A	WRB	2	TO MANY CHUMS FOR GOOD COUNT
10841010	North Arm Creek	8/15/01	0	15	39	0	54	F	TWR	2	
10880120	Little Talhtan River	7/30/01	0	0	4058	100	4158	H	KAP	3	includes 90 below weir
10880120	Little Talhtan River	7/30/01	0	0	3730	0	3730	H	JAD	2	
10880120	Little Talhtan River	8/6/01	0	0	2536	635	3171	H	KAP	2	murky, late
10880120	Little Talhtan River	8/13/01	0	0	10002	0	10002	W	DFO	3	weir
11014007	Farragut River	8/17/01	0	0	82	0	82	A	WRB	2	ALL BUT 5 UP LAKE FK BLW GORGE
11032009	Chuck R Windham Bay	7/1/01	0	0	7	0	7	A	TST	2	
11032009	Chuck R Windham Bay	8/5/01	0	0	8	0	8	A	WRB	2	
11032009	Chuck R Windham Bay	8/8/01	0	0	2	0	2	A	WRB	2	
11032009	Chuck R Windham Bay	8/10/01	0	0	4	0	4	A	WRB	2	2,500 ABV GORGE
11117010	King Salmon River	7/18/01	0	0	104	0	104	H	JAD	2	

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Stream no.	Stream	Date	Tidal	Mouth	Live	Dead	Total	Survey	Obs[a]	Use[b]	Comment
11117010	King Salmon River	7/19/01	0	0	47	0	47	H	KAP	2	early
11117010	King Salmon River	7/26/01	0	0	83	0	83	H	KAP	3	only 3 above forks
11117010	King Salmon River	7/26/01	0	0	52	0	52	H	JAD	2	
11117010	King Salmon River	7/26/01	0	0	98	0	98	F	KAP	3	plus 16 jacks
11132220	Nakina River	7/29/01	0	0	1045	5	1050	H	KAP	2	IA1
11132220	Nakina River	7/29/01	0	0	200	0	200	H	KAP	2	IA2
11132220	Nakina River	7/29/01	0	0	290	0	290	H	KAP	2	IA3, bad tailwind
11132220	Nakina River	7/29/01	0	0	1020	0	1020	H	JAD	2	total
11132220	Nakina River	8/6/01	0	0	460	20	480	H	KAP	3	IA1, water high
11132220	Nakina River	8/6/01	0	0	65	0	65	H	KAP	3	IA2
11132220	Nakina River	8/6/01	0	0	843	50	893	H	KAP	3	IA3
11132220	Nakina River	8/6/01	0	0	89	25	114	H	KAP	3	IA4
11132220	Nakina River	8/6/01	0	0	1457	95	1552	H	KAP	3	peak survey, combined total
11132240	Kowatua Creek	8/11/01	0	0	808	0	808	H	KAP	3	
11132240	Kowatua Creek	8/20/01	0	0	1010	20	1030	H	KAP	3	
11132240	Kowatua Creek	8/20/01	0	0	850	0	850	H	JAD	2	
11132240	Kowatua Creek	8/27/01	0	0	900	150	1050	H	KAP	3	all spawnouts, ~50 above weir
11132240	Kowatua Creek	8/27/01	0	0	750	0	750	H	JAD	2	
11132255	Tatsamenie River	8/20/01	0	0	572	0	572	H	KAP	3	IA1, below little Tats
11132255	Tatsamenie River	8/20/01	0	0	434	0	434	H	KAP	3	IA2, 228 to forks, 206 outlet big lake
11132255	Tatsamenie River	8/20/01	0	0	1006	0	1006	H	KAP	3	total
11132255	Tatsamenie River	8/20/01	0	0	1030	0	1030	H	JAD	2	
11132255	Tatsamenie River	8/27/01	0	0	440	30	470	H	KAP	3	IA1, below little Tats
11132255	Tatsamenie River	8/27/01	0	0	554	0	554	H	KAP	3	IA2, 300 below forks, lots sockeye
11132255	Tatsamenie River	8/27/01	0	0	740	0	740	H	JAD	2	
11132255	Tatsamenie River	8/27/01	0	0	994	30	1024	H	KAP	3	peak total
11132270	Nahlin River	7/20/01	0	0	761	5	766	H	KAP	3	IA3
11132270	Nahlin River	7/20/01	0	0	173	0	173	H	KAP	3	IA2
11132270	Nahlin River	7/29/01	0	0	613	30	643	H	KAP	3	IA3
11132270	Nahlin River	7/29/01	0	0	202	0	202	H	KAP	3	IA2
11132270	Nahlin River	7/29/01	0	0	90	0	90	H	KAP	3	IA1
11132270	Nahlin River	7/29/01	0	0	935	30	965	H	KAP	3	peak total
11132270	Nahlin River	7/29/01	0	0	914	0	914	H	JAD	2	total
11132275	Tseta Creek	7/29/01	0	0	202	0	202	H	KAP	3	partial survey
11132275	Tseta Creek	8/6/01	0	0	119	6	125	H	KAP	2	

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Stream no.	Stream	Date	Tidal	Mouth	Live	Dead	Total	Survey	Obs[a]	Use[b]	Comment
11132280	Dudidontu River	7/30/01	0	0	477	2	479	H	KAP	3	225 below Matsu
11132280	Dudidontu River	7/30/01	0	0	468	0	468	H	JAD	2	
11132280	Dudidontu River	8/6/01	0	0	318	30	348	H	KAP	2	157 below Matasu
11150052	Montana Creek	8/3/01	0	0	1	0	1	F	RRW	2	
11150069	Fish Creek-Douglas I	8/3/01	21	0	31	0	52	F	RRW	2	
11150069	Fish Creek-Douglas I	8/20/01	130	0	342	13	485	F	LED	2	
18230020	Kluckshu River (CAN)	9/4/01	0	0	1843	0	1843	W	DFO	3	weir
18230042	Tatshenshine R (CAN)	8/1/01	0	0	7	0	7	F	KAP	2	Low Fog Creek
18230043	Takhanni River (CAN)	8/1/01	0	0	287	0	287	H	KAP	3	
18230045	Goat Creek	8/2/01	0	0	21	0	21	H	JAD	2	
18230050	Blanchard Ck (CAN)	8/1/01	0	0	543	0	543	H	KAP	3	365 below bridge, 99 above lake
18230050	Blanchard Ck (CAN)	8/1/01	0	0	381	0	381	H	JAD	2	

[a] Observer initials on file in Commercial Fisheries IFDB/ALEX database.

[b] IFDB Standard Usage Codes: 1= not useful for indexing or estimating escapement; 2= potentially useful for indexing or estimating escapement; 3= Potentially useful as the “peak” survey count for this species.

Appendix A4.–Estimated abundance and composition by age and sex of the escapement of chinook salmon to select systems in Southeast Alaska and transboundary rivers, 2001.

		Brood year and age class														
		1999	**1998**	**1997**	**1998**	**1997**	**1996**	**1997**	**1996**	**1995**	**1996**	**1995**	**1994**	**1995**	**1994**	
		0.1	**1.1**	**2.1**	**0.2**	**1.2**	**2.2**	**0.3**	**1.3**	**2.3**	**0.4**	**1.4**	**2.4**	**0.5**	**1.5**	**Total**
Panel A. Age composition of medium and large chinook salmon in the Keta River in 2001																
Males	n	1	20		5	26		11	47		1					**111**
	%	0.6	12.8		2.9	15.8		6.3	26.9		0.6					**65.9**
	SE of %	0.7	3.5		1.3	3.1		1.9	3.6		0.6					**4.1**
	Escapement	9	174		40	215		85	366		8					**896**
	SE of esc.	9	49		10	40		28	74		8					**133**
Females	n							5	43		2	9		1		**60**
	%							2.8	24.5		1.1	5.1		0.6		**34.1**
	SE of %							1.3	3.4		0.8	1.7		0.6		**4.1**
	Escapement							39	333		15	70		8		**464**
	SE of esc.							18	71		11	25		8		**91**
Combined	n	1	20		5	26		16	90		3	9		1		**171**
	%	0.6	12.8		2.9	15.8		9.1	51.3		1.7	5.1		0.6		**100.0**
	SE of %	0.7	3.5		4.0	3.1		2.2	4.6		1.0	1.7		0.6		
	Escapement	9	174		40	215		124	698		23	70		8		**1,360**
	SE of esc.	9	49		20	49		36	125		14	25		8		**194**
Abundance of medium fish Keta and Blossom rivers, from personal communication Scott McPherson, 2003.																
Panel B. Age composition of medium and large chinook salmon in the Blossom River in 2001																
Males	n	1	20		1	14		3	5							**44**
	%	0.7	13.2		0.7	9.2		12.5	13.8							**50.0**
	SE of %	0.7	5.9		0.7	4.3		7.0	6.9							**11.0**
	Escapement	7	143		7	100		136	150							**544**
	SE of esc.	7	76		7	54		78	79							**177**
Females	n							3	4			5				**12**
	%							12.5	16.7			20.8				**50.0**
	SE of %							7.0	7.9			8.6				**11.0**
	Escapement							136	181			227				**544**
	SE of esc.							78	90			100				**151**
Combined	n	1	20		1	14		6	9			5				**56**
	%	0.7	13.2		0.7	9.2		25.0	30.5			20.8				**100.0**
	SE of %	0.7	5.9		0.7	4.3		9.3	9.6			8.6				
	Escapement	7	143		7	100		272	332			227				**1,088**
	SE of esc.	7	76		6	54		109	118			100				**227**
Panel C. Age composition of medium and large chinook salmon in the Chickamin River in 2001[a]																
Males	n		16			72			267			66			2	**423**
	%		5.4			16.8			26.8			6.6			0.2	**55.8**
	SE of %		1.8			3.6			2.1			0.9			0.1	**3.1**
	Escapement		344			1,080			1,724			422			13	**3,583**
	SE of esc.		115			247			331			93			9	**554**
Females	n								321			120			3	**444**
	%								32.0			12.0			0.3	**44.2**
	SE of %								2.4			1.3			0.2	**3.1**
	Escapement								2,054			768			19	**2,841**
	SE of esc.								395			158			11	**541**
Combined	n		16			72			588			186			5	**867**
	%		5.4			16.8			58.8			18.5			0.5%	**100.0**
	SE of %		1.8			3.6			3.8			1.7			0.2%	
	Escapement		344			1,080			3,778			1,190			32	**6,424**
	SE of esc.		115			247			710			236			15	**1,025**

[a] From Freeman and McPherson *in prep*.

-continued-

		1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995	1994	1995	1994	
PANEL D. AGE COMPOSITION OF MEDIUM AND LARGE CHINOOK SALMON IN THE UNUK RIVER IN 2001[b]																
		BROOD YEAR AND AGE CLASS														
		1999	**1998**	**1997**	**1998**	**1997**	**1996**	**1997**	**1996**	**1995**	**1996**	**1995**	**1994**	**1995**	**1994**	
		0.1	**1.1**	**2.1**	**0.2**	**1.2**	**2.2**	**0.3**	**1.3**	**2.3**	**0.4**	**1.4**	**2.4**	**0.5**	**1.5**	**Total**
Males	n		8			90			354			86			2	**540**
	%		0.7			8.3			32.5			7.9			0.2	**49.6**
	SE of %		0.3			1.2			1.5			0.8			0.1	**1.6**
	Escapement		83			935			3,680			894			21	**5,613**
	SE of esc.		30			127			439			136			15	**580**
Females	n					1			312			235				**548**
	%					0.1			28.7			21.6				**50.4**
	SE of %					0.1			1.4			1.3				**1.6**
	Escapement					10			3,243			2,443				**5,697**
	SE of esc.					10			394			307				**659**
Combined	n		8			91			666			321			2	**1,088**
	%		0.7			8.4			61.2			29.5			0.2	**100.0**
	SE of %		0.3			1.2			1.6			1.4			0.1	
	Escapement		83			946			6,923			3,337			21	**11,310**
	SE of esc.		30			127			789			404			15	**1,187**
[b] From: Weller and McPherson *in prep.*																
PANEL E. AGE COMPOSITION OF SMALL, MEDIUM AND LARGE CHINOOK SALMON IN THE STIKINE RIVER IN 2001																
Males	n		101			34		1	695	3		135			2	**971**
	%		1.6			0.9		0.1	40.0	0.1		7.9			0.1	**50.7**
	SE of %		0.3			0.2		0.1	1.2	0.1		0.7			0.1	**1.2**
	Escapement		1,068			547		20	26,128	88		5,166			77	**33,094**
	SE of esc.		179			125		10	2,503	56		638			55	**3,010**
Females	n					3			587	4		240			3	**837**
	%					0.1			34.6	0.2		14.2			0.2	**49.3**
	SE of %					0.1			1.2	0.1		0.9			0.1	**1.2**
	Escapement					60			22,568	155		9,285			116	**32,183**
	SE of esc.					42			2,205	78		1,018			68	**3,060**
Combined	n		101			37		1	1,282	7		375			5	**1,808**
	%		1.6			1.0		0.1	74.6	0.4		22.1			0.3	**100.0**
	SE of %		0.3			0.2		0.1	1.1	0.1		1.0			0.1	**0.0**
	Escapement		1,068			607		20	48,696	243		14,451			193	**65,277**
	SE of esc.		179			133		10	4,506	97		1,482			88	**6,016**
[c] From: DerHovanisian et al. 2002.																
PANEL F. AGE COMPOSITION OF MEDIUM AND LARGE CHINOOK SALMON IN ANDREW CREEK IN 2001																
Males	n					4			42			41				**87**
	%					2.2			22.8			22.3				**47.3**
	SE of %					1.1			3.1			3.1				**3.7**
	Escapement					46			481			470				**997**
	SE of esc.															
Females	n								35			61			1	**97**
	%								19.0			33.2			0.5	**52.7**
	SE of %								2.9			3.5			0.85	**3.7**
	Escapement								401			699			11	**1,111**
	SE of esc.															
Combined	n					4			77			102			1	**184**
	%					2.2			41.8			55.4			0.5	**100.0**
	SE of %					1.1			3.6			3.7			0.5	**0.0**
	Escapement					46			882			1,169			11	**2,108**
	SE of esc.															

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		Brood year and age class														
Panel G. Age composition of medium and large chinook salmon in the King Salmon River in 2001																
		1999	**1998**	**1997**	**1998**	**1997**	**1996**	**1997**	**1996**	**1995**	**1996**	**1995**	**1994**	**1995**	**1994**	
		0.1	**1.1**	**2.1**	**0.2**	**1.2**	**2.2**	**0.3**	**1.3**	**2.3**	**0.4**	**1.4**	**2.4**	**0.5**	**1.5**	**Total**
Males	n					7			5			1				**13**
	%					35.0			25.0			5.0				**65.0**
	SE of %					10.9			9.9			5.0				**10.9**
	Escapement					79			57			11				**147**
	SE of esc.															
Females	n								1			6				**7**
	%								5.0			30.0				**35.0**
	SE of %								5.0			10.5				**10.9**
	Escapement								11			68				**79**
	SE of esc.															
Combined	n					7			6			7				**20**
	%					35.0			30.0			35.0				**100.0**
	SE of %					10.9			10.5			10.9				
	Escapement					79			68			79				**226**
	SE of esc.															
From Personal communication Scott McPherson, 2003.																
Panel H. Age composition of medium and large chinook salmon in the Taku River in 2001[d]																
Males	n		2			200	3		349	5		49	1		1	**610**
	%		0.1			10.4	0.2		40.3	0.6		5.9	0.1		0.1	**57.7**
	SE of %		0.1			2.4	0.1		1.9	0.3		0.8	0.1		0.1	**2.0**
	Escapement		44			4,765	98		18,486	274		2,683	55		55	**26,459**
	SE of esc.		32			1,051	63		2,837	128		547	55		55	**3,581**
Females	n								237			118				**355**
	%								28.2			14.1				**42.3**
	SE of %								1.7			1.3				**2.0**
	Escapement								12,912			6,462				**19,374**
	SE of esc.								2,067			1,118				**3,020**
Combined	n		2			200	3		586	5		167	1		1	**965**
	%		0.1			10.4	0.2		68.5	0.6		20.0	0.1		0.1	**100.0**
	SE of %		0.1			2.4	0.1		2.3	0.3		1.5	0.1		0.1	
	Escapement		44			4,765	98		31,398	274		9,145	55		55	**45,833**
	SE of esc.		32			1,051	63		4,731	128		1,516	55		55	**6,343**
[d] From: Jones and McPherson *In Prep.*																
Panel I. Age composition of medium and large chinook salmon in the Chilkat River in 2001[e]																
Males	n					124			286			66				**477**
	%					14.3			31.3			16.3				**62.0**
	SE of %					1.4			1.8			1.1				**1.8**
	Escapement					755			1,651			858				**3,274**
	SE of esc.					209			252			277				**368**
Females	n								152			87				**239**
	%								16.7			21.4				**38.0**
	SE of %								1.5			1.2				**1.8**
	Escapement								878			1,130				**2,008**
	SE of esc.								142			359				**386**
Combined	n					124			438			153				**716**
	%					17.3			61.2			21.4				**100.0**
	SE of %					1.4			1.8			1.5				
	Escapement					755			2,529			1,988				**5,272**
	SE of esc.					209			376			617				**752**
[e] From: Ericksen 2002.																

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Appendix A4.–Page 4 of 5.

PANEL J. AGE COMPOSITION OF MEDIUM AND LARGE CHINOOK SALMON IN THE ALSEK RIVER IN 2001[f]

		Brood year and age class														
		1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995	1994	1995	1994	
		0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5	Total
Males	n		2			55			182	1		72			2	**314**
	%		0.3			9.5			28.4	0.2		11.2			0.3	**49.9**
	SE of %		0.3			2.6			1.9	0.2		1.3			0.2	**2.4**
	Escapement		44			1,218			3,661	20		1,441			40	**6,424**
	SE of esc.		32			360			472	20		233			28	**763**
Females	n					5			258			59				**322**
	%					0.8			40.2			9.2				**50.1**
	SE of %					0.4			2.3			1.2				**2.4**
	Escapement					106			5,173			1,181				**6,461**
	SE of esc.					50			648			201				**786**
Combined	n		2			60			440	1		131			2	**636**
	%		0.3			10.3			68.6	0.2		20.3			0.3	**100.0**
	SE of %		0.3			2.8			2.6	0.2		1.8			0.2	
	Escapement		44			1,325			8,835	20		2,621			40	**12,885**
	SE of esc.		32			378			1,039	20		370			28	**1,438**

[f] From: Pahlke and Etherton 2002.

PANEL K. AGE COMPOSITION OF SMALL, MEDIUM AND LARGE CHINOOK SALMON IN THE SITUK RIVER IN 2001

Males	n	8	1		15	2		4	1		14					**45**
	%	7.8	1.0		14.6	1.9		3.9	1.0		13.6					**43.7**
	SE of %	2.5	0.9		3.3	1.3		1.8	0.9		3.3					**4.7**
	Escapement	71	9		133	18		36	9		125					**400**
	SE of esc.															
Females	n				5			15			37			1		**58**
	%				4.9			14.6			35.9			1.0		**56.3**
	SE of %				2.0			3.3			4.6			0.9		**4.7**
	Escapement				44			133			329			9		**516**
	SE of esc.															
Combined	n	8	1		20	2		19	1		51			1		**103**
	%	7.8	1.0		19.4	1.9		18.4	1.0		49.5			1.0		**100.0**
	SE of %	2.5	0.9		3.8	1.3		3.7	0.9		4.7			0.9		
	Escapement	145	18		160	16		152	8		409			8		**916**
	SE of esc.	90	18		32	11		32	8		40			8		**101**

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SUMMARY. PERCENTAGE AGE COMPOSITION ESTIMATED FROM CHINOOK SALMON SAMPLED IN 11 SOUTHEAST ALASKA RIVERS IN 2001.[a]

	BROOD YEAR AND AGE CLASS													
	1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995	1994	1995	1994
	0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5
1. Keta	NE	13%		3%	16%		9%	51%		2%	5%			
2. Blossom	NE	13%		1%	9%		25%	31%			21%			
3. Chickamin	NE	5%			17%			59%			19%			<1%
4. Unuk	NE	NE			8%			61%			30%			<1%
5. Stikine	NE	2%			1%			75%	<1%		22%			<1%
6. Andrew Cr	NE	NE			2%			42%			55%			<1%
7. King Salmon	NE	NE			35%			30%			35%			
8. Taku	NE	<1%			10%	<1%		69%	<1%		20%	<1%		<1%
9. Chilkat	NE	NE			17%			61%			21%			
10. Alsek	NE	NE			10%			69%	<1%		21%			<1%
11. Situk	8%	1%		19%	2%		18%	1%		50%			1%	

[a] Small fish not included in experimental design, except on Stikine and Situk Rivers, 2001.

Summary. Estimated numbers of chinook salmon by age class in escapements to 11 key Southeast Alaska rivers in 2001.

	BROOD YEAR AND AGE CLASS														
	1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995	1994	1995	1994	
	0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5	Total
1. Keta	9	174	0	40	215	0	124	698	0	23	70	0	8	0	1,360
2. Blossom	7	143		7	100	0	272	332	0	0	227	0	0	0	1,088
3. Chickamin		344			1,080			3,778			1,190	0	0	32	6,424
4. Unuk		83		0	946	0	0	6,923	0	0	3,337	0	0	21	11,310
5. Stikine	0	1,068			607		20	48,696	243	0	14,451	0	0	193	65,277
6. Andrew Cr				0	46	0	0	882	0	0	1,169	0	0	11	2,108
7. King Salmon				0	79	0	0	68	0	0	79	0	0	0	226
8. Taku		44		0	4,765	98	0	31,398	274	0	9,145	55	0	55	45,834
9. Chilkat		0		0	755	0	0	2,529	0	0	1,988	0	0	0	5,272
10. Alsek		41		0	1,250	0	0	8,817	20	0	2,622	0	0	41	12,791
11. Situk	145	18		160	16	0	152	8	0	409	0	0	8	0	916

Summary. Percentage sex composition that were males by age class estimated from chinook salmon sampled in 11 key Southeast Alaska rivers in 2001.

	BROOD YEAR AND AGE CLASS													
	1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995	1994	1995	1994
	0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5
1. Keta	100%	100%		100%	100%		69%	52%		31%	0%			
2. Blossom	100%	100%						43%			0%			
3. Chickamin		100%			100%			45%			35%			
4. Unuk		100%			99%			53%			27%			100%
5. Stikine		100%			92%			54%			36%			40%
6. Andrew Cr					100%			55%			40%			
7. King Salmon					100%			83%			14%			
8. Taku		100%			100%			59%			29%			
9. Chilkat					100%			65%			43%			100%
10. Alsek		100%			92%			41%			55%			
11. Situk	100%	100%		83%	100%		23%	100%		27%			0%	
Average	100%	100%		88%	98%		45%	59%		29%	28%			80%

Appendix A5.–Average length (MEF), by age, of chinook salmon in selected systems in Southeast Alaska and transboundary rivers, 2001.

PANEL A. AVERAGE LENGTH OF CHINOOK SALMON IN THE KETA RIVER IN 2001															
		BROOD YEAR AND AGE CLASS													
		1999	**1998**	**1997**	**1998**	**1997**	**1996**	**1997**	**1996**	**1995**	**1996**	**1995**	**1994**	**1995**	**1994**
		0.1	**1.1**	**2.1**	**0.2**	**1.2**	**2.2**	**0.3**	**1.3**	**2.3**	**0.4**	**1.4**	**2.4**	**0.5**	**1.5**
Males	n	4	39		5	26		11	47		1				
Average length		439	437		675	642		799	836		1,010				
	SD	15	32		31	57		43	91						
	SE	7	5		14	11		13	13						
Females	n							5	43		2	9		1	
Average length								854	847		923	936		955	
	SD							47	47		25	34			
	SE							21	7		18	11			
Combined	n	4	39		5	26		16	90		3	9		1	
Average length		439	437		675	642		816	841		952	936		955	
	SD	15	32		31	57		50	73		53	34			
	SE	7	5		14	11		12	8		31	11			

PANEL B. AVERAGE LENGTH OF CHINOOK SALMON IN THE BLOSSOM RIVER IN 2001															
Males	n							3	3						
Average length								853	847						
	SD							119	48						
	SE							69	28						
Females	n							3	4			5			
Average length								867	833			935			
	SD							18	54			36			
	SE							10	27			16			
Combined	n							6	7			5			
Average length								860	839			935			
	SD							77	48			36			
	SE							31	18			16			
PANEL C. AVERAGE LENGTH OF CHINOOK SALMON IN THE CHICKAMIN RIVER IN 2001															
Males	n		22			72			267			66			2
Average length			437			643			836			929			893
	SD		42			54			67			68			25
	SE		9			6			4			8			18
Females	n								321			120			3
Average length									850			909			965
	SD								41			50			110
	SE								2			5			64
Combined	n		22			72			588			186			5
Average length			437			643			844			916			936
	SD		42			54			54			58			88
	SE		9			6			2			4			40

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PANEL D. AVERAGE LENGTH OF CHINOOK SALMON IN THE UNUK RIVER IN 2001[b].															
		BROOD YEAR AND AGE CLASS													
		1999	**1998**	**1997**	**1998**	**1997**	**1996**	**1997**	**1996**	**1995**	**1996**	**1995**	**1994**	**1995**	**1994**
		0.1	**1.1**	**2.1**	**0.2**	**1.2**	**2.2**	**0.3**	**1.3**	**2.3**	**0.4**	**1.4**	**2.4**	**0.5**	**1.5**
Males	n		10			96			296			83			2
Average length			402			633			813			901			1000
	SD		23			49			60			64			7
	SE		7			5			3			7			5
Females	n					6			267			125			1
Average length						686			825			897			890
	SD					15			44			50			
	SE					6			3			5			
Combined	n		10			102			563			208			3
Average length			402			636			818			899			963
	SD		23			50			53			56			64
	SE		7			5			2			4			37
[b] From: Weller and McPherson *in prep*.															
PANEL E. AVERAGE LENGTH OF CHINOOK SALMON IN THE STIKINE RIVER IN 2001[c]															
Males	n		2			9			352	1		69			2
Average length			406			621			774	839		866			879
	SD		6			114			56			58			66
	SE		4			38			3			7			47
Females	n								321	4		112			1
Average length									780	804		834			857
	SD								36	12		32			
	SE								2	6		3			
Combined	n		2			9			673	5		181			3
Average length			406			621			777	804		846			871
	SD		6			114			52	18		54			48
	SE		4			38			2	6		4			28
[c] From: Little Tahltan River Samples: DerHovanisian et al. 2003.															
PANEL F. AVERAGE LENGTH OF CHINOOK SALMON IN ANDREW CREEK IN 2001															
Males	n					4			42			41			
Average length						583			759			888			
	SD					112			85			52			
	SE					56			13			8			
Females	n								35			61			1
Average length									803			854			850
	SD								39			44			
	SE								7			6			
Combined	n					4			77			102			1
Average length						583			779			868			850
	SD					112			71			50			
	SE					56			8			5			

-continued-

PANEL G. AVERAGE LENGTH OF CHINOOK SALMON IN THE KING SALMON RIVER IN 2001

		BROOD YEAR AND AGE CLASS													
		1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995	1994	1995	1994
		0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5
Males	n					7			5			1			
Average length						650			795			880			
	SD					26			62						
	SE					10			28						
Females	n								1			6			
Average length									855			898			
	SD											64			
	SE											26			
Combined	n					7			6			7			
Average length						650			805			896			
	SD					26			60			59			
	SE					10			25			22			

PANEL H. AVERAGE LENGTH OF CHINOOK SALMON IN THE TAKU RIVER IN 2001[d]

		0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5
Males	n		45			200	3		349	5		49	1		1
Average length			334			581	613		754	790		860	895		980
	SD		35			53	78		62	59		38			
	SE		5			4	45		3	26		3			
Females	n								237			118			1
Average length									774			845			845
	SD								42			38			
	SE								33			3			
Combined	n		45			200	3		586	5		167	1		2
Average length			334			581	613		762	790		849	895		913
	SD		35			53	78		55	59		47			95
	SE		5			4	45		2	26		4			67

[d] From: Jones and McPherson *In Prep*

PANEL I. AVERAGE LENGTH OF CHINOOK SALMON IN THE CHILKAT RIVER IN 2001[e]

		0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5
Males	n		15			124			286			66			1
Average length			374			604			788			894			915
	SD		32			60			74			70			
	SE		8			5			4			9			
Females	n								152			87			
Average length									808			860			
	SD								41			47			
	SE								3			5			
Combined	n		15			124			438			153			1
Average length			374			604			795			875			915
	SD		32			60			65			60			
	SE		8			5			3			5			

[e] From: Ericksen 2002.

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PANEL J. AVERAGE LENGTH OF CHINOOK SALMON IN THE ALSEK RIVER IN 2001[f]														
	BROOD YEAR AND AGE CLASS													
	1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995	1994	1995	1994
	0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5
Males n		1			49			121			33			1
Average length		326			547			793			899			974
SD					48			75			75			
SE					73			7			12			
Females n					5			192			38			
Average length					595			798			854			
SD					196			54			49			
SE					88			4			8			
Combined n		1			54			313			71			1
Average length		326			552			796			875			974
SD					72			63			63			
SE					10			4			8			

[f] From: Klukshu River weir: Pahlke and Etherton 2002.

PANEL K. AVERAGE LENGTH OF CHINOOK SALMON IN THE SITUK RIVER IN 2001														
	0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5
Males n	8	1		15	2		4	1		14				
Average length	383	390		559	595		714	845		852				
SD	20			55	21		70			583				
SE	7			14	15		4			16				
Females n				5			15			37			1	
Average length				537			798			849			825	
SD				59			22			44				
SE				27			6			37				
Combined n	8	1		20	2		19	1		51			1	
Average length	383	390		554	595		780	845		850			825	
SD	20			55	21		49			48				
SE	7			20	15		11			7				

-continued-

Summary. Average length of male chinook salmon sampled in Southeast Alaska in 2001

	BROOD YEAR AND AGE CLASS													
	1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995	1994	1995	1994
	0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5
1. Keta	439	437		675	642		799	836		1,010				
2. Blossom							853	847						
3. Chickamin		437			643			836			929			893
4. Unuk		402			633			813			901			
5. Stikine					621			774	839		866			879
6. Andrew Cr					583			759			888			
7. King Salmon					650			795			880			
8. Taku		334			581			754	790		860			980
9. Chilkat		374			604			788			894			
10. Alsek					547			793			899			
11. Situk	383			559			714			852				

Summary. Average length of female chinook salmon sampled in Southeast Alaska in 2001

	BROOD YEAR AND AGE CLASS													
	1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995	1994	1995	1994
	0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5
1. Keta							854	847		923	936			
2. Blossom							867	833			935			
3. Chickamin								850			909			965
4. Unuk					686			825			897			
5. Stikine								780	804		834			857
6. Andrew Cr								803			854			
7. King Salmon								855			898			
8. Taku								774			845			845
9. Chilkat								808			860			
10. Alsek					595			798			854			
11. Situk				537			798			849	0			

Summary. Average length of chinook salmon sampled in Southeast Alaska in 2001 sexes combined

	BROOD YEAR AND AGE CLASS													
	1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995	1994	1995	1994
	0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5
1. Keta	439	437		675	642		816	841		952	936			
2. Blossom							860	839			935			
3. Chickamin		437			643			844			916			936
4. Unuk		402			636			818			899			
5. Stikine					621			777	804		846			871
6. Andrew Cr					583			779			868			
7. King Salmon					650			805			896			
8. Taku		334			581			762	790		849			913
9. Chilkat		374			604			795			875			
10. Alsek		326			552			796			875			
11. Situk	383			554			780			850				
Averages	411	385		615	612		819	806	797	901	890			907

Note: age classes with fewer than four fish sampled were not reported in summary panels.

Appendix A6.–Differences in mean lengths (Panel A) and test results (Z, Panel B) for statistical differences in mean lengths between age-1.2 chinook salmon (sexes combined) sampled in 11 rivers in Southeast Alaska in 2001.

Panel A. Differences in mean lengths for age-1.2 fish, sexes combined

	Age	Average		Difference in mean length										
System	class	length	SE	Keta	Blossom	Chickamin	Unuk	Stikine	Andrew Cr	King Salmon	Taku	Chilkat	Alsek	Situk
1. Keta	1.2	642	11	0		1	-6	-21	-59	8	-61	-38	-90	
2. Blossom	1.2													
3. Chickamin	1.2	643	6	-1		0	-7	-22	-60	7	-62	-39	-91	
4. Unuk	1.2	636	5	6		7	0	-15	-53	14	-55	-32	-84	
5. Stikine	1.2	621	38	21		22	15	0	-38	29	-40	-17	-69	
6. Andrew Cr	1.2	583	56	59		60	53	38	0	67	-2	21	-31	
7. King Salmon	1.2	650	10	-8		-7	-14	-29	-67	0	-69	-46	-98	
8. Taku	1.2	581	4	61		62	55	40	2	69	0	23	-29	
9. Chilkat	1.2	604	5	38		39	32	17	-21	46	-23	0	-52	
10. Alsek	1.2	552	10	90		91	84	69	31	98	29	52	0	
11. Situk	1.2													

Panel B. Test values for differences in mean lengths for age-1.2 fish, sexes combined

	Age	Average		Test statistics for differences in mean length										
System	class	length	SE	Keta	Blossom	Chickamin	Unuk	Stikine	Andrew Cr	King Sal.	Taku	Chilkat	Alsek	Situk
1. Keta	1.2	642	11	0.00		0.08	-0.49	**-0.53**	**-1.03**	0.54	**-5.17**	**-3.06**	-6.05	
2. Blossom	1.2													
3. Chickamin	1.2	643	6	-0.08		0.00	**-0.87**	**-0.57**	**-1.06**	0.60	**-8.39**	**-4.68**	**-7.79**	
4. Unuk	1.2	636	5	0.49		**0.87**	0.00	**-0.39**	-0.94	1.27	**-8.86**	**-4.37**	-7.65	
5. Stikine	1.2	621	38	**0.53**		**0.57**	**0.39**	0.00	-0.56	0.74	**-1.05**	**-0.44**	-1.76	
6. Andrew Cr	1.2	583	56	**1.03**		**1.06**	0.94	0.56	0.00	1.18	-0.04	0.37	-0.55	
7. King Salmon	1.2	650	10	-0.54		-0.60	-1.27	-0.74	-1.18	0.00	**-6.56**	**-4.10**	-7.06	
8. Taku	1.2	581	4	**5.17**		**8.39**	**8.86**	**1.05**	0.04	**6.56**	0.00	3.50	-2.76	
9. Chilkat	1.2	604	5	**3.06**		**4.68**	**4.37**	**0.44**	-0.37	**4.10**	-3.50	0.00	-4.65	
10. Alsek	1.2	552	10	6.05		**7.79**	7.65	1.76	0.55	7.06	2.76	4.65	0.00	
11. Situk	1.2													

Appendix A7.–Differences in mean lengths (Panel A) and test results (Z, Panel B) for statistical differences in mean lengths between age-1.3 chinook salmon (sexes combined) sampled in 11 rivers in Southeast Alaska in 2001.

Panel A. Differences in mean lengths for age-1.3 fish, sexes combined

	Age	Average		Difference in mean length										
System	class	length	SE	Keta	Blossom	Chickamin	Unuk	Stikine	Andrew Cr	King Sal.	Taku	Chilkat	Alsek	Situk
1. Keta	1.3	841	8	0	-2	3	-23	-64	-62	-36	-79	-46	-45	-8
2. Blossom	1.3	839	18	2	0	5	-21	-62	-60	-34	-77	-44	-43	-18
3. Chickamin	1.3	844	2	-3	-5	0	-26	-67	-65	-39	-82	-49	-48	-2
4. Unuk	1.3	818	2	23	21	26	0	-41	-39	-13	-56	-23	-22	-2
5. Stikine	1.3	777	2	64	62	67	41	0	2	28	-15	18	19	-2
6. Andrew Cr	1.3	779	8	62	60	65	39	-2	0	26	-17	16	17	-8
7. King Sal.	1.3	805	24	36	34	39	13	-28	-26	0	-43	-10	-9	-24
8. Taku	1.3	762	2	79	77	82	56	15	17	43	0	33	34	-2
9. Chilkat	1.3	795	3	46	44	49	23	-18	-16	10	-33	0	1	-3
10. Alsek	1.3	796	4	45	43	48	22	-19	-17	9	-34	-1	0	-4
11. Situk	1.3	845	0	-4	-6	-1	-27	-68	-66	-40	-83	-50	-49	0

Panel B. Test values for differences in mean lengths for age-1.3 fish, sexes combined

	Age	Average		Test statistics for differences in mean length										
System	class	length	SE	Keta	Blossom	Chickamin	Unuk	Stikine	Andrew Cr	King Sal.	Taku	Chilkat	Alsek	Situk
1. Keta	1.3	841	8	0.00	-0.10	**0.37**	**-2.87**	**-8.05**	**-5.59**	**-1.40**	**-9.85**	**-5.54**	**-5.31**	-1.92
2. Blossom	1.3	839	18	0.10	0.00	0.27	**-1.15**	**-3.40**	**-3.03**	**-1.12**	**-4.21**	**-2.39**	**-2.33**	-4.06
3. Chickamin	1.3	844	2	**-0.37**	-0.27	0.00	**-8.24**	**-22.38**	**-7.83**	**-1.59**	**-25.77**	**-12.82**	**-11.43**	-0.45
4. Unuk	1.3	818	2	**2.87**	**1.15**	**8.24**	0.00	**-13.67**	**-4.70**	**-0.53**	**-17.58**	**-6.01**	**-5.23**	-0.10
5. Stikine	1.3	777	2	**8.05**	**3.40**	**22.38**	**13.67**	0.00	**0.24**	1.14	**-4.96**	4.87	4.65	-0.03
6. Andrew Cr	1.3	779	8	**5.59**	**3.03**	**7.83**	**4.70**	**-0.24**	0.00	1.01	-2.04	**1.86**	**1.94**	-0.13
7. King Sal.	1.3	805	24	**1.40**	**1.12**	**1.59**	**0.53**	-1.14	-1.01	0.00	-1.75	-0.41	-0.36	-0.68
8. Taku	1.3	762	2	**9.85**	**4.21**	**25.77**	**17.58**	**4.96**	2.04	1.75	0.00	**8.58**	**8.05**	-0.03
9. Chilkat	1.3	795	3	**5.54**	**2.39**	**12.82**	**6.01**	-4.87	**-1.86**	0.41	**-8.58**	0.00	0.21	-0.07
10. Alsek	1.3	796	4	**5.31**	**2.33**	**11.43**	**5.23**	-4.65	**-1.94**	0.36	**-8.05**	-0.21	0.00	-0.08
11. Situk	1.3	845	0	**-0.52**	**-0.33**	-0.45	-12.09	**-34.00**	**-8.25**	**-1.63**	**-36.53**	**-16.10**	-13.76	0.00

Appendix A8.–Differences in mean lengths (Panel A) and test results (Z, Panel B) for statistical differences in mean lengths between age-1.4 chinook salmon (sexes combined) sampled in 11 rivers in Southeast Alaska in 2001.

Panel A. Differences in mean lengths for age-1.4 fish, sexes combined

	Age	Average		Difference in mean length										
System	class	length	SE	Keta	Blossom	Chickamin	Unuk	Stikine	Andrew Cr	King Sal.	Taku	Chilkat	Alsek	Situk
1. Keta	1.4	936	11	0	-1	-20	-37	-90	-68	-40	-87	-61	-61	
2. Blossom	1.4	935	16	1	0	-19	-36	-89	-67	-39	-86	-60	-60	
3. Chickamin	1.4	916	4	20	19	0	-17	-70	-48	-20	-67	-41	-41	
4. Unuk	1.4	899	4	37	36	17	0	-53	-31	-3	-50	-24	-24	
5. Stikine	1.4	846	4	90	89	70	53	0	22	50	3	29	29	
6. Andrew Cr	1.4	868	5	68	67	48	31	-22	0	28	-19	7	7	
7. King Sal.	1.4	896	22	40	39	20	3	-50	-28	0	-47	-21	-21	
8. Taku	1.4	849	4	87	86	67	50	-3	19	47	0	26	26	
9. Chilkat	1.4	875	5	61	60	41	24	-29	-7	21	-26	0	0	
10. Alsek	1.4	875	7	61	60	41	24	-29	-7	21	-26	0	0	
11. Situk	1.4													

Panel B. Test values for differences in mean lengths for age-1.4 fish, sexes combined

	Age	Average		Test statistics for differences in mean length										
System	class	length	SE	Keta	Blossom	Chickamin	Unuk	Stikine	Andrew Cr	King Sal.	Taku	Chilkat	Alsek	Situk
1. Keta	1.4	936	11	0.00	-0.05	-1.65	**-3.09**	**-7.49**	**-5.49**	**-1.60**	**-7.31**	**-5.00**	**-4.49**	
2. Blossom	1.4	935	16	0.05	0.00	-1.14	-2.17	**-5.36**	**-3.97**	**-1.42**	**-5.21**	-3.59	-3.38	
3. Chickamin	1.4	916	4	1.65	1.14	0.00	**-2.95**	**-11.99**	**-7.31**	**-0.88**	**-11.97**	**-6.60**	-4.77	
4. Unuk	1.4	899	4	**3.09**	2.17	**2.95**	0.00	**-9.51**	**-4.90**	**-0.13**	**-9.40**	**-4.02**	-2.85	
5. Stikine	1.4	846	4	**7.49**	**5.36**	**11.99**	**9.51**	0.00	**3.44**	**2.21**	**0.55**	**4.80**	3.42	
6. Andrew Cr	1.4	868	5	**5.49**	**3.97**	**7.31**	**4.90**	**-3.44**	0.00	1.23	-3.07	**1.04**	**0.78**	
7. King Sal.	1.4	896	22	**1.60**	**1.42**	**0.88**	**0.13**	**-2.21**	-1.23	0.00	-2.08	**-0.92**	**-0.89**	
8. Taku	1.4	849	4	**7.31**	**5.21**	**11.97**	**9.40**	**-0.55**	3.07	2.08	0.00	**4.48**	**3.13**	
9. Chilkat	1.4	875	5	**5.00**	3.59	**6.60**	**4.02**	**-4.80**	**-1.04**	**0.92**	**-4.48**	0.00	0.00	
10. Alsek	1.4	875	7	**4.49**	3.38	4.77	2.85	-3.42	**-0.78**	**0.89**	**-3.13**	0.00	0.00	
11. Situk	1.4													

Appendix A9.–Computer files used to complete this report.

File name	Description
TOTALCHTS.XLW	Excel workbook with tables and charts with annual counts for each index area.
SUMVER01.XLS	Appendix table A2, with expanded escapement totals for Southeast Alaska
ESC01.XLS	Table 1. Estimated chinook escapement in 2001.
GOALS.XLS	Appendix Table A1. Expanded goals for Southeast Alaska.
AGELENGTHSEAK2001.XLS	Appendix Table A4-A7. Length and age summaries for 2001